

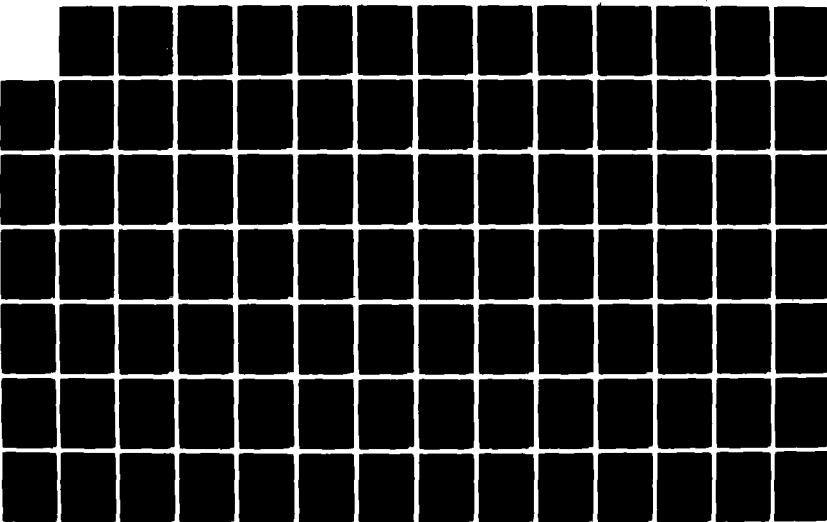
AD-A121 567

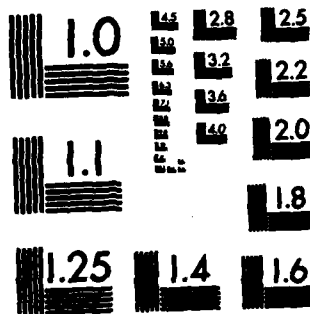
A MODEL FOR THE EVALUATION OF OFFSETS IN INTERNATIONAL
ARMS TRANSFERS(U) SAINT LOUIS UNIV MO H L BAILEY 1982

UNCLASSIFIED

F/G 15/5

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS
BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A121567	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A Model for the Evaluation of Offsets in International Arms Transfers		5. TYPE OF REPORT & PERIOD COVERED FINAL, 1982
7. AUTHOR(s) Henri Louis Bailey		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Graduate School St. Louis University St. Louis, Missouri 63108		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Air Force Business Research Mgt Ctr (AFBRMC/RDCB) Wright-Patterson AFB, Ohio 45433		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 1982
		13. NUMBER OF PAGES 287
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

6. DISTRIBUTION STATEMENT (of this Report)

Unlimited Distribution -- Approved for Public Release

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Unlimited Distribution -- Approved for Public Release

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Foreign Military Sales
Cooperative Research and Development
Coproduction
Foreign procurement
Offset

Offset Agreements
Mathematical Models

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This research produced a more comprehensive understanding of the offset process and the reasons for implementation of certain codevelopment and coproduction proposals. The analysis presented in this research examines 191 cases of attempts to establish international codevelopment or coproduction programs between the US Department of Defense and foreign government from 1952 through 1978. In the literature review, a comprehensive summary of the evaluation of the offset process as well as a global

examination of the various governmental departments having responsibilities for portions of the offset proposal process are presented. A descriptive mathematical model for determining the likelihood of implementation or nonimplementation of an offset proposal from a foreign country using as inputs political preferences, economic factors, and national security considerations is also developed. This model can aid decision makers in evaluating future offset proposals. A simple manual model for evaluating the political stability of nations seeking business in the US is also developed. Though the stability model is subjective, it provides guidelines where none existed before, and can reduce the decision maker's area of unknown variability.

**A MODEL FOR THE EVALUATION OF OFFSETS
IN INTERNATIONAL ARMS TRANSFERS**

by

Henri Louis Bailey, B.A., M.B.A.

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special
A	

**A Digest Presented to the Faculty of the Graduate
School of Saint Louis University in Partial
Fulfillment of the Requirements for the
Degree of Doctor of Philosophy**



1982

82 11 16 024

Offset: The procedure established to allow a foreign government to diminish the amount paid for procurements from U.S. contractors. Generally, the items are related to defense. Offsets vary. They may include the shared costs and efforts in international cooperative research and development (codelvelopment) programs with each participant receiving full rights to the programs. They may include coordinated production (coproduction) programs with each participant sharing in the advanced technology, learning curves, attainment of skilled workers and production processes, production and profits from third country sales. Or most simply they may include joint agreements to purchase off-the-shelf items from each other. An individual offset proposal may include total weapon system development from basic research to final sales or be limited to selected portions thereof.

The optimal use of national resources is an important management decision for government policy makers. Any optimal solution must include national foreign policy goals, governmental and commercial economic objectives and considerations for the security of weapons systems and ultimately the nation. One method that is being increasingly employed to reduce outlays of national resources is the

utilization of offset agreements in international arms transfers.

This research examined past efforts at offsets in which the Department of Defense was implicated and which involved either cooperative research and development or coordinated production. It looked at the political and economic conditions that existed at the time the proposals were made and the, then, outstanding national security (military) considerations. Each of these conditions was reviewed to see whether or not they were influential in the implementation or nonimplementation of the offset efforts.

A mathematical model was formulated and developed in the study for use as a management tool. It was designed to aid in categorizing the question of offset proposals in future foreign policy considerations as to likelihood for implementation or nonimplementation by relating those new proposals to the known results of past decisions.

The analysis in this dissertation examined 191 cases of attempts to establish programs of international codevelopment or coproduction in which the U.S. Department of Defense was involved during the period January 1, 1952 to December 31, 1978. Some of these cases successfully attained the

proposed objective, implementation. The others ended in dissatisfaction for the negotiating parties.

In the review of the literature potential variables were identified and aggregated into 17 variables used in this research. One of those variables, national stability, required an extensive sub-study and development of an additional model for ascertaining the status of national stability.

The hypothesis of interest in this study was that political preferences, economic factors and national security considerations can be combined into a mathematical model for offset analysis. The research answered the following related questions:

- (1) Can a mathematical model be developed that would have described the likelihood for success of past offset proposals within national policy guidelines?
- (2) Can the model developed be utilized as a tool in the evaluation of future offset proposals?

**A MODEL FOR THE EVALUATION OF OFFSETS
IN INTERNATIONAL ARMS TRANSFERS**

by

Henri Louis Bailey, B.A., M.B.A.

**A Dissertation Presented to the Faculty of the Graduate
School of Saint Louis University in Partial
Fulfillment of the Requirements for the
Degree of Doctor of Philosophy**

1982

COMMITTEE IN CHARGE OF CANDIDACY:

Assistant Professor Laurence A. Madeo
Chairperson and Adviser

Associate Professor Jean-Robert Leguey-Feilleux

Associate Professor Neil E. Seitz

ACKNOWLEDGMENTS

The completion of this dissertation is a tribute, not so much to my perserverence, as to the love, tolerance and inspiration of my family, friends and mentors. The persons who have contributed to my physical and mental health during the quest for this goal are numerous; far too numerous for me to list them all. Hopefully no offense will be taken if a deserving contributor does not find his or her name here, for their support was and is deeply appreciated. But the contributions of some individuals were so extensive that they must be enumerated.

To my former boss and long-time friend Brigadier General David M. Hall, Jr. goes my thanks for convincing me to seek a doctorate and for allowing me, with our full and demanding schedule, the flexibility to be available for all of my scheduled classes.

To Doctor Leroy J. Grossman, Professor of Economics and former Associate Dean, School of Business and Administration and to his successor, Dr. Stephen W. Miller, Associate Professor of Marketing, goes my sincere appreciation for their aid, assistance and succorance in helping me to

establish and continue an ambitious schedule of studies in the doctoral program.

For his patience, prodding, direction and incomparable instruction I will forever be indebted to Dr. No Kyoan Kwak, Professor of Management Sciences who, during my stay in residence, was Chairman of the Department of Management Sciences.

A special note of thanks must be extended to the members of my orals committee for their stewardship of a critical phase of my education. For ensuring that I was thoroughly prepared, thank you Dr. Gerald E. Parker, Associate Professor of Management Sciences, Dr. John G. Napoli, Professor of Psychology and Dr. Thomas M. Stevenson, Jr., Associate Professor of Economics.

To Mr. Jacques Paul Klein of the Department of State, a friend and associate since childhood, must go a heartfelt thanks for his introductions to those in the State Department who could assist me in tracking the necessary data. The hours saved in finding sources of research materials are incalculable.

To Mr. Mark Easton, Office of Security Assistance and Sales, Department of State and Mr. Frank Cevasco, Office of International Security Policy, Department of Defense goes my gratitude for their generosity in steering me to the right persons

for information on codevelopment and coproduction proposals. More importantly they are due thanks for taking the time to grant me interviews that aided immeasurably my understanding of current policy and issues in the offset arena.

To Doctor Neil E. Seitz, Associate Professor of Finance, who as a member of my dissertation committee provided guidance, inspiration and friendship goes the credit for ensuring that the international aspects of business in this research were cogently and thoroughly considered.

Doctor Jean-Robert Leguey-Feilleux, Associate Professor of Political Science, another member of my dissertation committee, took this neophyte by the hand and led me through a thorough research into national stability. This study could never have been completed without his guidance and direction.

To my dissertation committee chairman, Dr. Laurence A. Madeo, Assistant Professor of Management Sciences, who over the course of our association has become a warm and cherished friend as well as a mentor, I owe a debt of gratitude that can never be repaid. He has seen me through the high and low points of this research and has prodded when that was needed and encouraged when that brought the best results.

How can I ever begin to thank my good friends, Dr. Walter E. Washington and his lovely wife Ruth? They insisted that I stay with them during my trips to St. Louis and made their home my home.

A lady who deserves a special thank you is my typist, Mrs. Diane Tuininga. Repeatedly she took the disheveled pile of hieroglyphics that I handed her and returned them as neat, correct, proofed documents that were intelligible even to me.

My heart and my appreciation go out to a very special lady to me, Mrs. Lillian C. Huffman, my mom. Her prayers, encouragement and offers of help throughout this entire period were unceasing.

Finally, I owe a debt that cannot be recaptured to my wife, Carolyn Elizabeth Ladd and our two sons, Henri Louis, IV and Shawn Howard. They surrendered time and love that was due them from husband and father to the pursuit of this goal. They cajoled and caressed, shared my elations and depressions and watched the weeks turn into years. A very real part of their lives is in this document.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	iii
LIST OF TABLES	x
LIST OF FIGURES	xii
CHAPTER 1 - AN INTRODUCTION TO OFFSETS	1
1.1 BACKGROUND OF THE PROBLEM	2
1.1.1 Delineation of the Offset Problem	3
1.1.2 Significance of Offsets to Arms Sales	5
1.1.3 How this Research Addresses the Offset Problem	10
1.2 DEFINITIONS OF KEY TERMS AND CONCEPTS	12
1.3 OBJECTIVES OF THIS RESEARCH	20
1.3.1 Overall Objective: Develop a Mathematical Model to Categorize Poten- tial Offset Proposals	20
1.3.2 The Past: Results of Previous Cooperative Research and Development and Coordinated Production Agreements	21
1.3.3 The Present: Development of the Descriptive Model	22
1.4 VALUE OF THIS RESEARCH	23
CHAPTER 2 - THE EVOLUTION OF OFFSETS	28
2.1 FORERUNNERS: INDUSTRY INTEGRATION COMMITTEES OF THE ARMY ORDNANCE DEPARTMENT	30
2.2 MILITARY ASSISTANCE PROGRAMS (GRANT AID)	36
2.3 FOREIGN MILITARY SALES	40
2.3.1 Transition from Grant Aid	40
2.3.2 U.S. Policy	43
2.3.3 Buy America Act	47
2.3.4 Balance of Payments Implications	51

TABLE OF CONTENTS--Continued

	Page
2.4 OFFSET AGREEMENTS IN INTER- NATIONAL ARMS TRANSFERS	55
2.4.1 Political Considerations. . .	56
2.4.1.1 Stability in Governments	73
2.4.2 National Security Concerns. .	86
2.4.3 Economic Factors	90
2.4.4 Legal Aspects of Codevelop- ment/Coproduction	97
2.5 RESPONSIBILITY FOR NATIONAL OBJECTIVES	101
2.5.1 Department of State Role . .	101
2.5.2 Department of Defense Role .	103
2.5.3 Role of Other Executive Agencies	106
2.5.4 Effect of Membership in International Organizations .	107
2.5.5 Problems Experienced in the Past	108
2.6 OTHER RELATED AREAS FOR RESEARCH . . .	109
2.7 SUMMARY	111
CHAPTER 3 - DESIGN OF THE INVESTIGATION	112
3.1 RESEARCH METHOD/PROCEDURE	113
3.1.1 Aggregation of the Variables	133
3.1.2 Classification of the Variables	136
3.1.3 Stability Factors and Model Development	142
3.1.4 Revision of the Stability Factor Model	157
3.2 CHOICE OF TECHNIQUE - DISCRIMINANT ANALYSIS	160
3.3 DATA USED IN THE RESEARCH	163
3.4 OBJECTIVES OF THE RESEARCH	164
3.5 DATA SYSTEMS USED IN THE STUDY	166
CHAPTER 4 - MODELS, DATA AND ANALYSIS	167
4.1 SELECTING THE DISCRIMINATING VARIABLES	168
4.2 DETERMINING NATIONAL STABILITY	175
4.3 TESTING THE DATA	187
4.3.1 Stepwise Discrimination with Rao's V	188
4.3.1.1 Means and Standard Deviations	189

TABLE OF CONTENTS--Continued

	Page
4.3.1.2 Matrix of Pair- wise F Ratios . . .	189
4.3.1.3 Summary of the Stepwise Discrimin- ation	192
4.3.2 Examining Plots of Dis- criminant Scores	201
CHAPTER 5 - CONCLUSIONS OF THE ANALYSES	206
5.1 DIFFICULTIES ENCOUNTERED	207
5.2 SIGNIFICANCE OF THE RESULTS	210
5.3 GENERALIZATION OF THE RESULTS	215
5.4 SUGGESTIONS FOR FURTHER RESEARCH	216
5.5 SUMMARY.	219
BIBLIOGRAPHY	220
APPENDICES	
A. U.N. Least Developed Countries	233
B. U.N. Major Petroleum Exporters	234
C. Developed Countries List - IBRD	235
D. Countries Permitting U.S. Basing With Codevelopment/Coproduction Agreements	239
E. Codevelopment/Coproduction Proposals by Country, Alphabetical (1952-1978) . .	240
F. Codevelopment/Coproduction Proposals, Chronological (1952-1978).	241
G. Index of Revolution, Coup d'Etat or Social Unrest by Country with Offset Agreement.	242
H. Offset Data Sheets	247
I. Stability Data Sheets	258
J. SPSS Control File Program	269
K. SPSS Control File Program Modified for Classification Purposes Only	271
VITA	272

LIST OF TABLES

Table	Page
I. Initial List of Codevelopment and Coproduction Projects Between January 1, 1960 and December 31, 1978 with U.S. DOD Involvement	114
II. Factors Affecting Cooperation in Codevelopment/Coproduction Projects	116
III. Variables Affecting Cooperation by Political, Economic, National Security Factor	137
IV. Variables Categorized by (A) Desirability and (B) Essentiality	141
V. Factors of Internal Stability	144
VI. Aggregated Stability Factors	155
VII. Model for National Stability Determination	158
VIII. List of Codevelopment and Coproduction Projects Between January 1, 1952 and December 31, 1978 with U.S. DOD Involvement	176
IX. Data Means	190
X. Data Standard Deviations	191
XI. F Ratios Between Groups During Step-wise Discrimination	193
XII. Discriminant Analysis Summary Tables	195
XIII. Classification Function Coefficients	197
XIV. Canonical Discriminant Function Coefficients--Standardized and Non-standardized	198

LIST OF TABLES--Continued

Table	Page
XV. Variables' Importance (Rank) to Discrimination of Implemented or Non-Implemented Groupings	200
XVI. Canonical Discriminant Functions Evaluated at Group Centroids	203
XVII. Classification Results	203

LIST OF FIGURES

Figure		Page
1.	A Political/Economic Risk Forecasting Model	67
2.	A Political/Social Risk Forecasting Model	70
3.	All Groups Histogram for Analysis with Missing Value Cases Excluded . . .	204
4.	All Groups Histogram for Total Cases Analysis with X16 Suppressed . .	205

Chapter One

AN INTRODUCTION TO OFFSETS

The initiation of this research was a suggestion from the Business Research Management Center of the Air Force Institute of Technology during the fall of 1975.¹ Captain Dunlap, the Air Force research monitor for business administration at that time, mentioned the increased pressure from allied air forces and their governments for cooperative research and development, and coordinated production for new weapon systems. Although several ventures of this nature had been negotiated previously, the United States government and U.S. contractors had a limited familiarity with this aspect of international business. From the Air Force perspective any research in this area would be welcomed.

¹The United States Air Force maintains a Business Research Management Center (BRMC) as a part of the Air Force Institute of Technology at Wright-Patterson AFB, Ohio. BRMC keeps track of ongoing research that may affect the Air Force and suggests areas of research where there is a data deficiency and the Air Force has a need for knowledge. To the extent that researchers are willing to undertake projects of interest to the Air Force, BRMC negotiates with them on actual directions of the research and reimbursement for administrative and travel expenses and costs for publication.

Extensive reading and enquiry was begun. As time went by and familiarity with the subject increased, areas requiring research emerged; many more than are addressed in this study. During the literature search one underlying question became pre-eminent. Can a standard method of evaluation be applied to offset proposals during initial consideration to determine if they fit the political, economic, and national security goals of the United States? These considerations and, indeed, the entire concept of offsets in international arms sales are not peculiar to the United States Air Force alone. They have implications for the entire Department of Defense. This research addresses offset proposals from a national policy rather than a military department perspective.

Background

Offset proposals are the latest development in the realm of foreign military sales. They represent an evolution in United States government policy on international arms transfers from the initial lend lease program through grant aid proposals to the complex formulae for sharing costs and other know-how that are in use today. That development, from genesis to current practice, will be the subject of Chapter Two. This chapter will address the delineation

of the offset problem; its significance to arms transfers; how the problem is addressed in this research; operational definitions; and the objectives and perceived value of this research.

Delineation of the Offset Problem

According to Fish, "Offset procurement provides the opportunity to foreign governments to bid on either procurements of U.S. corporations or of the DOD (Department of Defense). The procedure is done to offset a portion of the amount paid by the foreign government for defense items bought from U.S. contractors."² He goes on to say that "an offset agreement is a 'best efforts' arrangement. The law and DOD procurement regulations stipulate that contracts must be awarded on a competitive basis to the maximum extent feasible. We apply the same principles to subcontracts to the extent we consent to subcontracts or approve a contractor's purchasing system."³ Fish, strictly speaking, does not like to classify

²Howard M. Fish, "Co-Production and Offset Arrangements in Security Assistance Program," (Speech presented at the 1976 International Conference on Procurement and Grants Management held at the Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976, University of Virginia, Proceedings, 1976), p. 23.

³Ibid.

coproduction as an offset but recognizes that, broadly speaking, it belongs there. He states it thusly:

A U.S. contractor may offer the customer the chance to coproduce the items being offered for sale. Although this is not strictly "offset", it could be considered "offset" in a broad sense. There are both advantages and disadvantages to the customer country, the U.S. and to the U.S. contractor. The customer keeps jobs in his own country; but he often has to pay a higher price since the co-produced parts mean extra tooling and plant costs plus the fact that his own industry is starting to produce at the beginning of the learning curve.

This added expense to a developing country may be well worth the cost if the country places a high priority on upgrading capacity, attaining skilled workers, and acquiring understanding of advanced technology. The coproduction here is mainly for the purpose of educating and establishing an industrial base.

For a developed country which already has an advanced industrial base, the coproduction effort could be categorized as a form of offset inasmuch as it serves to divert some of the purchase price back into its own economy.⁴

Vandevanter does not make that fine distinction between offsets and coordinated production and includes the concept of offset within the idea of coproduction. He notes that, "the aim of coordinated production is to pool the efforts of several nations to build an identical article. Though collaboration on a major item of hardware, such as a tank, would

⁴Howard M. Fish, op. cit., p. 24.

incidentally contribute considerably to standardization, the emphasis would be on the economies of production--efficiency through quantity runs, specialization in component manufacture, and the sharing of overhead burdens and of research and development costs. . . . The concept of coordinated production draws its value from the belief that it can be beneficial to all the parties involved, buyers as well as sellers."⁵

Significance of Offsets to Arm Sales

The appeal of offsets to both governments and industry becomes readily apparent. Advantages in economies of scale, standardization, technology transfer, industrial expansion and technical development are but a few of the advantages. Vandevanter goes right to the heart of the matter.

The biggest advantage of coordinated production that its proponents cite is the reduction in the cost of weapons. As nations combine to buy large quantities of a single item, they profit from the economies of scale. Their sharing the burden of research, development, engineering and testing will also help lower the cost of the end product. Then, too, it has been pointed out that the smaller nations, whose industries could not produce entire weapon systems, and who might well be squeezed out in unrestricted competition among

⁵ Elliott Vandevanter, Jr., International Logistics: Interallied Collaboration in Weapons Production (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 6.

the big manufacturers, could participate in NATO-wide programs as subcontractors.⁶

Fish acknowledges the impelling reasons for entry into offset arrangements from the negative perspective of DOD policy. Nevertheless, the significance of this form of international exchange is clear.

With exceptions which I will note later, DOD prefers that foreign military sales be negotiated without "offset" procurement arrangements wherever possible. The DOD enters such arrangements reluctantly and only at the insistence of the foreign customer. This insistence has been fostered by: (1) the customer's need to come up with some type of "compensation" program to get legislative support at home for the purchase; (2) the knowledge that, for some defense items at least, there was a competition in the wings eager to sell; (3) the customer's need to funnel some part of the production of the item to its own defense industry because of (a) employment needs, (b) technology acquisition, and (c) the need to maintain a native defense industrial capacity. There is increased pressure on customers to get an offset program in today's competitive environment.

The USG (United States Government), besides recognizing the above pressures, is increasingly aware of the need to reduce overall free-world defense expenditures while maintaining high combat readiness. The USG believes that savings can be made by increased "standardization" and "rationalization" among NATO nations, i.e.--each should concentrate on doing what it does best rather than spend in areas of redundant research, development and production. To achieve this all the Western Nations including the United States must be willing to "standardize" around the more effective defense systems.

This rationalization is making the USG more flexible in regard to "offset" in NATO.

⁶Elliott Vandeventer, Jr., op. cit., p. 5.

The idea of "offset" itself is changing. In the past it often meant customer participation in production of the item being purchased, now it is becoming (a) "reciprocal procurement" i.e., customer and U.S. procurement of entire systems from each other as in the U.S.--U.K. Memorandum of Understanding (MOU) currently being implemented, or (b) massive co-production as in the present F-16 consortium arrangement. The present Swiss F-5 offset arrangement seems to bridge this difference: the Swiss will compete to win subcontracts both within and outside the F-5 program with Northrup and General Electric, and if need be, the USG may, under defined circumstances, offer to Swiss industry the opportunity to compete competitively for prime DOD contracts. The U.S. contractors will also assist Swiss industry in its efforts to find markets in the U.S. and in third countries. This is a new approach.⁷

In a report on benefits and drawbacks of U.S. participation in military cooperative research and development programs with allied countries the Comptroller General gave a broader perspective that was not restricted to the NATO alliance.

Department of Defense (DOD) policies regulating international cooperative research and development provide for maximum coordination of U.S. technical objectives and programs with those of our allies. The purpose is to strengthen military alliances and to better use free world technical and economic resources made available for military purposes.

In international cooperative research and development programs, the United States and one or more of its allies join together to fulfill a common requirement, sharing cost and effort in predetermined ratios with each participant receiving full rights to the program results. These programs are also called joint international research and development programs.

⁷Howard M. Fish, op. cit., pp. 24-25.

The policies provide for U.S. participation in cooperative research and development only when it is in the overall best interests of the United States. The principal goals contained in DOD Directive 3100.3 are as follows:

1. To make the best equipment available to the United States and its allies as possible.
2. To increase the effectiveness of the scientific and technical resources of the United States and its allies, especially by eliminating unnecessary and wasteful duplicated effort.
3. To standardize equipment as much as possible.
4. To create closer military ties among the allies.

The policies restrict cooperation to those programs which satisfy a military need and provide the United States with design and production rights equivalent to those secured from domestic sources. Moreover, preference is to be given to programs not adversely affecting the U.S. balance of payments.⁸

McLaren listed goals for research, development, and production from the NATO perspective. He says the following:

Increased NATO cooperation in research and development has been an announced objective of the United States for many years. Our goal is to achieve the best possible utilization of the scientific and technical resources of our Allies in satisfying requirements for increasingly complex and costly military equipment and to avoid

⁸U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs with Allied Countries, Report to the Congress (Washington, D.C., 1973), pp. 5-6.

duplication of R & D efforts within the Alliance. We want to achieve standardization of military equipment within NATO wherever compatible with operations and logistics. Where standardization cannot be achieved, we want compatibility in operations and interchangeability of high-density components and high-volume consumables in logistics.⁹

Cattledge and Knudsen, in their analysis of the F-104 coproduction projects noted four economic advantages that flowed to the United States as prime developer and contractor in a coproduction agreement.

They were:

1. Direct military sales.
2. Reverse gold flow
3. Assistance in the development of new design technology.
4. Royalties and patent rights.¹⁰

Perhaps the considerations that should go into an offset proposal are best stated by Fish from a U.S. point of view.

⁹ William D. McLaren, United States Defense Industry Guide for Conducting Business with NATO Organizations and Member Countries (Washington, D.C., U.S. Government Printing Office, 1971), p. 15.

¹⁰ Morris B. Cattledge and Larrie F. Knudsen, "Foreign Military Sales: United States Involvement in Coproduction and Trends Toward Codevelopment" (Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1969), p. 63.

In summary, the benefits and burdens of co-production are receiving much thought and attention. On the one hand, Governments seek to lessen their dependence on foreign sources of supply and to broaden their industrial base. On the other hand, we must be cognizant of our own economic present and future, and the health of our own defense production. At times it is to be encouraged, at times discouraged. Simply put, it is an area in which we cannot generalize. Each case is unique. In each we must examine the benefits, examine the burdens, and ask ourselves, "What best serves U.S. national interests in this case?"¹¹

How This Research Addresses the Problem

The body of this dissertation is structured to take the reader through this research experience from beginning to the successful conclusion. Researching the literature presented the initial problem in even starting the study. Due in part to the relative newness of this entire field there was no concise and consolidated body of knowledge to reference. The research effort encompassed cooperative research and development, coordinated and joint production efforts, foreign military sales, international cooperative logistics, technology transfer, arms transfers, peace and disarmament studies, balance of payments, production/share costing, national stability and various treaties. Leads were found and pieced together into the historical evolution of offset

¹¹Howard M. Fish, op. cit., p. 30.

agreements that is told in Chapter Two.

A side issue arose during the literature search as to who is responsible for the various aspects of a potential offset agreement. That information was ferretted out and is also presented in Chapter Two in a section entitled "Responsibility for National Objectives."

A consideration thought important in evaluating offsets was the question of national stability. The issue is raised in the historical development in Chapter Two and carries through the remainder of the research as a major substudy to this effort.

Once the historical perspective has been established the design of the investigation is covered in detail. In the particular case of this research it would almost be correct to say that the design of two investigations is covered in detail. The development of the Model for the Evaluation of Offset Proposals in International Arms Transfers is meticulously described. Then the same attention is given to the development of the Model for National Stability. Chapter Three closes with a discussion of the choice of the statistical technique, the methods used to accumulate the data so that the research could, if necessary, be widely replicated, a

reiteration of the objectives of the research and a description of the data systems used in the study.

The models in usage, the data and the analysis from rudimentary statistics to sophisticated statements of significance are addressed in Chapter Four.

The research conclusion including significance and generalization of the results are explored in the fifth chapter. The study closes with the suggestions for further research that emerged during the investigation and a final summary of the importance of this work.

Definitions of Key Terms and Concepts

Acceptance, Letter of Offer is the U.S. Department of Defense (DD) Form 1513 Offer and Acceptance by which the U.S. Government offers to sell to a foreign government or international organization defense articles and defense services pursuant to the Foreign Military Sales Act, as amended. The DD Form 1513 lists the items and/or services, estimated costs, the terms and conditions of sale, and provides for the foreign government's signature to indicate acceptance.¹²

¹²James T. Coleman, et al., "On Some Aspects of Foreign Military Sales" (research report, Air Command and Staff College, Air University, Maxwell Air Force Base, Alabama, 1975), p. 196.

Access Rights are the right for military aircraft to land at particular air bases or civil aerodromes and be serviced. Requirements and protocol for civil aircraft are covered by the agreements of the International Civil Aviation Organization.

Arms Transfers are defined as the exchange of defense articles and defense services such as arms, ammunition and implements of war, including components thereof and the training, manufacturing licenses, technical assistance and technical data related thereto provided by the government. For the U.S. government they are provided under the Foreign Military Sales Act, as amended; other statutory authority; or directly by commercial firms to foreign countries, foreign private firms or to international organizations.¹³

Balance of Payments is a system of accounting which attempts to record all economic transactions between the residents of a country and residents of foreign countries during a given period. A balance of payments statement classifies and summarizes the transactions in a way which shows the major sources of receipts and the principal types of payments. The main categories

¹³James T. Coleman, op. cit., pp. 199-200.

for recording transactions, as standardized by the International Monetary Fund are goods and services, transfer payments, and capital and monetary gold.¹⁴

Buy America Act of 1933 (41 USC 10a-d) is a government-wide procurement policy to restrict contract awards for foreign articles, materials and supplies.

Codevelopment is the foreshortened form of cooperative research and development.¹⁵

Coproduction is the foreshortened form of coordinated production and involves both the transfer of manufacturing technology and/or sharing of production of a system.¹⁶

Developed Country is a country so designated by the U.S. Treasury Department in applying an interest equalization tax and listed in section 1 of Executive Order 11285, 10 June 1966. All countries not listed are less developed.¹⁷

¹⁴Stefan H. Robock and Kenneth Simmonds, International Business and Multinational Enterprises (Homewood, Illinois: Richard D. Irwin, Inc., 1973), pp. 70-73.

¹⁵Arthur S. Leach and Dennis H. Majkowski, "An Analysis of the F-16 Offset Commitment" (Master's thesis, Air University, 1975), p. 136.

¹⁶Ibid.

¹⁷James T. Coleman, et al., op. cit., p. 211.

Elite is the upper or ruling class within a society.

Foreign Military Sales (FMS) refers to reimbursable sales of defense articles and services to foreign governments and international organizations under the authority of the Foreign Military Sales Act or successor legislation. Included are cash sales from the Department of Defense (DOD) inventories, procurement by DOD for cash sales, credit sales, and DOD guarantees of private financing of credit sales.¹⁸

Grant Aid. See Military Assistance Program.

IBRD is the acronym for the International Bank for Reconstruction and Development.

International Cooperative Logistics is a system that assures continuing and effective support of military equipment by one, or more, friendly government(s), usually the seller. Applies to the United States and the integration of foreign customer requirements into the DOD logistics system.¹⁹ Support may include technical training and education, parts and stockage, transportation methods, technical

¹⁸ Jack Lester McChesney, "The Evolution of the Foreign Military Sales Program and Its Impact on Defense Procurement Policies and Procedures (Doctoral dissertation, George Washington University, 1976), p. 7.

¹⁹ LeRoy J. Haugh, International Logistics: Foreign Military Sales (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 19.

advisors and appropriate cataloging and distribution systems.

Joint production is an agreement between two or more nations to produce the same product to the same specifications on complete and separate production lines.

Lend Lease Program of 1941 was a program established during World War II to provide the sale, loan, lease, exchange or other disposition of any defense article to any government deemed vital to U.S. security.

Lesser Developed Country. See Developed Country.

Memorandum of Understanding (MOU) is the agreement between the U.S. government and a foreign government or international organization that outlines the conditions for acquisition of military equipment.²⁰

Military Assistance Advisory Group (MAAG) is the first level of contact in all requests for assistance from a foreign government. A MAAG is staffed with members of the military departments but is assigned to the diplomatic mission. There is one assigned to each country with which the U.S.

²⁰ Arthur S. Leach and Dennis H. Majkowski, op. cit., p. 136.

has diplomatic relations.

Military Assistance Program (MAP), also known as grant aid, refers to the transfer of defense articles and services to foreign governments and international organizations under the authority of the Foreign Assistance Act or successor legislation, for which the United States receives no monetary reimbursement.²¹

Marshall Plan is the Economic Cooperation Act of 1948. It was the U.S. grant aid program for the reconstruction of Europe following World War II.

Mass is the working class element of a society. It includes the middle classes in those societies where one has developed.

NATO is the acronym for the North Atlantic Treaty Organization.

National standards are the systems of weights and measures adopted by a nation as well as the methods of sizing or grading sheet metals, plate, wire, electronic components and engineering drawings.

Offset is the procedure established to allow a foreign government to diminish the amount paid for procurements from U.S. contractors. Generally, the items are related to defense. Offsets vary. They

²¹Howard M. Fish, op. cit., p. 23.

may include the shared costs and efforts in international cooperative research and development (co-development) programs with each participant receiving full rights to the programs. They may include coordinated production (coproduction) programs with each participant sharing in the advanced technology, learning curves, attainment of skilled workers and production processes, production and profits from third country sales. Or most simply they may include joint agreements to purchase off-the-shelf items from each other. An individual offset proposal may include total weapon system development from basic research to final sales or be limited to selected portions thereof. In coproduction agreements there are both direct and indirect offsets. Direct offsets are the procurement value that derives from participation in research, development or production of the military equipment. Indirect offsets derive from the value of all other procurements.²²

Overflight Rights are the rights for military aircraft to overfly a particular nation. Civil aircraft are covered by the agreements explicit in the International Civil Aviation Organization for most

²² Arthur S. Leach and Dennis H. Majkowski, op. cit., p. 136.

nations. Political confrontations may cause some additional requirements.

Rao's V is a statistical technique used to increase the degree of variability between two groups to make them as distinct as possible. The method chooses those variables that will increase the distance between group means or centroids to the maximum extent possible.

Readiness is the ability of the armed forces of a nation to wage war without an extensive period of preparation.

SHAPE is the acronym for Supreme Headquarters Allied Powers Europe.

SIPRI is the acronym for the Stockholm International Peace Research Institute.

Stability is the ability of a society to maintain its cohesiveness, institutions and governing apparatus over time.

Technology is most usefully defined in terms of a spectrum ranging from scientific publications and exchanges, at one end, to proprietary information and professionally qualified people, at the other. It is embodied in one of four primary forms: publications, products, proprietary information and people. The different forms represent higher and

higher levels and increasing value.²³

Technology Transfer is the process by which a given technique of know-how that transforms laboratory discoveries into industrial production is substantially moved from one set of users to another.²⁴

Objectives of this Research

Overall Objective

Operations research is the approach to decision making which asks specific questions about objectives and about controllable and uncontrollable input variables, and seeks to build mathematical models to describe the systems in which these input variables and output objectives interact. Its purpose is to help management make rational decisions.

It should be kept in mind that operations research neither eliminates nor diminishes the importance of the experience of individual managers and the intuitions and instincts born of that experience. Rather, operations research encourages managers to use these often immensely valuable assets in a rational way at the appropriate points in the decision making process as, for example, in delineating objectives, defining an appropriate value system, identifying possible courses of action,

²³ J. Kenneth Fasick, "International Sales: Perspectives on Technology Transfers and Contractual Obligations" in Proceedings of the 1976 International Conference on Procurement and Grants Management Held at the Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976 (Charlottesville: University of Virginia Conference on Procurement and Grants Management, 1976), p. 39.

²⁴ Ibid.

and assigning subjective probabilities to events or situations where available information is incomplete.²⁵

In consonance with that rationale and remaining mindful of the limitations of the approach, the overall objective of this research is to provide a mathematical model that can be used to objectively evaluate the likelihood of implementation or non-implementation of offset proposals over a spectrum of potential actions within long-range foreign policy goals.

The Past: Results of Previous
Codevelopment and Coproduction
Agreements

Prior agreements for codevelopment and coproduction have had a varied history. That history is covered extensively in Chapter Two and it provides a fertile ground for research. This research utilizes that history to study:

- (1) The outcome (implemented or non-implemented) of previous cooperative research and development and coordinated production agreements in the international arms transfer market.
- (2) The relationship of various market

²⁵ Samuel B. Richmond, Operations Research for Management Decisions (New York: The Ronald Press, 1968), p. v.

factors such as gross national product and balance of payments to outcomes of previous cooperative research and coordinated production agreements in the international arms market.

- (3) The political aspects of environment that affect arms transfers such as treaty obligations, governmental stability and the aspirations of lesser developed countries (LDCs) that the U.S. government wishes to keep in its sphere of influence.
- (4) The national security aspects of environment that must be considered in international arms transfers such as strategic and tactical readiness impacts and protection of technological advantage.

The data extracted is then utilized to formulate a mathematical model that fits the known results of those past codevelopment and coproduction efforts.

The Present: Development
of the Descriptive Model

The past provides a torch for looking forward into the future. It does not, and cannot, provide a

clear cut answer to what the problems of the present or future will be. But it allows us to formulate hypotheses of possible areas into which we may direct our efforts. The hypothesis of interest formulated in this study is:

Political preferences, economic factors and national security considerations can be combined into a mathematical model for offset proposal analysis.

In evaluating this hypothesis this research attempted to answer the following related questions:

- (1) Can a mathematical model be developed that would have described the likelihood for implementation of past offset proposals within national policy guidelines?
- (2) Can the model developed in (1) be utilized as a tool in the evaluation of future offset proposals?

Value of this Research

The optimal use of national resources is an important management decision for government policy makers. In the national security arena resource use is not simply determined by a delineation of desired

force levels. Any optimal solution must include national foreign policy goals, governmental and commercial economic objectives and considerations for the security of weapons systems and ultimately the nation.²⁶ The interaction of these concerns varies between complementary and oppositional. The mixture at any particular time will determine the optimal solution to the security resource allocation problem.²⁷

The employment of cooperative research and development and coordinated production, otherwise known as offset agreements or arrangements, has the potential for redistributing the total resource investment necessary for maintaining a desired level

²⁶ An informative discussion of the interaction of political, economic and national security (military) objectives is contained in: Stanley Lester Dolins, "The Economic Allocation of Share-Costs in Joint International Ventures: An Examination of the NATO and OECD-DAC Experience" (Doctoral dissertation, University of Colorado, 1965), pp. 62-68.

²⁷ Optimal resource allocation is an ongoing economic problem that must be solved by both individuals and nations. It is discussed in "guns and butter" terms in both of the following works: Armen A. Alchian and William R. Allen, Exchange and Production Theory in Use (Belmont, California: Wadsworth Publishing Company, Inc., 1969), pp. 3-10; see also Paul A. Samuelson, Economics: An Introductory Analysis (6th ed.; New York: McGraw-Hill Book Company, 1964), pp. 17-23.

of national security.²⁸ As in the overall national security picture, foreign policy decisions and non-fiscal security considerations join economic pressures in determining the feasibility of participating in an offset arrangement.²⁹ How, then, given a specific snapshot in time, do nations weigh the various considerations that contribute to a decision of whether or not to participate in an offset agreement? How do they ensure that the arrangement will fit into the long range national foreign policy objectives? How do they determine whether or not to risk the technological advantages that contribute to the superiority of a weapon system and the strength of national security?³⁰ This research attempts to

²⁸Cost reduction and cost sharing is addressed extensively in Harry Robert Biederman, "The Influence of Decreasing Costs on International Trade and Cooperation in Aerospace Products" (Doctoral dissertation, Columbia University, 1968), pp. 6-20 and pp. 136-142.

²⁹Factors impelling countries toward cooperative enterprises are addressed extensively in Langford Wheaton Smith, Jr., "An Approach to Costing Joint Production Based on Mathematical Programming with an Example from Petroleum Refining" (Doctoral dissertation, Leland Stanford University, 1962), pp. 1-32, 61-95, and 136-176; see also Harry Robert Biederman, op. cit., pp. 6-10.

³⁰A discussion of macro- and micro-economic factors is contained in Howard Ivan Lukens, "Co-production Within the United States Helicopter Industry" (Doctoral dissertation, George Washington University, 1975), pp. 399-409. Technology transfer is addressed extensively in Moonson Oh, "The Role of International Corporations in the Transfer of Technology to

supply a part of the answer to those questions.

Offset arrangements are generated by projects that are intrinsically expensive. That has been the prime factor that in the past has impelled companies and nations into cooperation and joint ventures. Inexpensive technological advantages are seldom risked or shared.³¹ The problem that exists for national government is to determine the appropriateness of an offset proposal in terms of foreign policy goals, economic objectives and fiscal and non-fiscal security considerations.

This paper proposes to develop a mathematical model, based upon historical data, that can be used as a management tool to aid in prioritizing potential offset arrangements. There are specific advantages to be expected from such a model. Modern weapon systems have long lead times and high production costs. Economies of scale can only be achieved through the economies of large production runs. Achieving these economies may depend on multi-nation purchases of a

Developing Countries" (Doctoral dissertation, University of Pennsylvania, 1970); see also David John Teece, "The Multinational Corporation and the Resource Cost of International Technology Transfer" (Doctoral dissertation, University of Pennsylvania, 1975), pp. 1-2, 101-132 and 178-189.

³¹The writings of Dolins, op. cit., pp. 1-32 and Biederman, op. cit., pp. 6-10 are excellent references for background on impelling factors toward offset arrangements.

system. A model that can distinguish between the likelihood of implementation or nonimplementation of an offset proposal early in the developmental process can help to prevent the expenditure of development and procurement resources on a project that is not likely to be implemented.

Chapter Two

THE EVOLUTION OF OFFSETS

Americans comprise a nation dedicated to business and as such the United States government has been prone to smile kindly on the purely capitalistic venture of turning a profit. Such has not always been the case with cooperative ventures even though historical accounts of such activities are plentiful. In the past it has been "natural" for the United States government to promote individuals or industries that sought to produce for outright sales. The acceptance of a concept of shared development and production, first nationally and later internationally, has not been as readily apparent. As we learned from Fish in the first chapter, ". . . DOD prefers that foreign military sales be negotiated without 'offset' procurement arrangements where ever possible."¹

This chapter will guide the reader through the transition from single producer, to joint production, to offsets. Starting in World War II with the forerunner to domestic coproduction, the Industry

¹Howard M. Fish, ("Co-Production and Offset Arrangements in Security Assistance Programs"), Speech presented at the 1976 International Conference on Procurement and Grants Management held at the Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976, p. 24.

Integration Committees of the Army Ordnance Department, the chapter will explore those forces that prompted cooperation in research and production. It will explore the evolution in thought, both in government and industry, that was necessary to allow the current ventures in codevelopment and coproduction. We will see that changes in patterns of thinking followed changes in policy, which flowed from political, national security, economic and legal concerns of government, that in turn were outgrowths of the defined areas of responsibility of the various executive agencies of the federal government and of commitments to international treaty organizations. With regard to policy, we will trace the transition from grant aid to foreign military sales to offsets and the collateral effects of the Buy America Act and concerns for Balance of Payments implications. In terms of concerns, we will look at political considerations including the inadequately defined area of stability and at the national security and economic factors that could have impacts. Mention will be made of legal concerns in the evolution of offsets, but that specialized area will not be explored in depth due to lack of legal expertise by the researcher. In this chapter we will explore the stated responsibilities of the Departments of State and Defense for securing national objectives and look at the impacts of other governmental agencies

and the effects of membership in international treaty organizations. Finally, the chapter will mention some of the past problems encountered in the evolution of offset agreements and highlight other related areas for research.

Forerunners: Industry Integration Committees
of the Army Ordnance Department²

. . . The United States faced World War II with an industrial system not equipped for war production, and with few prototype facilities in existence which could be used as patterns for new construction. Entire branches of industry had to be created, starting with the very excavation for the plant. There was much talk of the ease with which the automobile industry, for example, could be converted to tank production, but it was almost completely talk. Except for general purpose machine tools, some items of handling equipment, parts of conveyor systems and a few other items, conversion in practice usually meant shutting down, stripping the plant, moving in new production line equipment and then resuming operations.³

The speed with which American industry mobilized for war far outstripped the estimates made by enemy planners. The factors which made rapid mobilization possible were not obvious, and in fact were not recognized in advance by either friend or foe. Many of the arrangements and devices which proved highly successful in accelerating industrial mobilization, and increasing the volume of production, originated in the stress of feverish activity, and were launched without careful preplanning. They sprang from circumstances, and the hammering

²All references in this section of the chapter are to a unique work by George Stern Quick, "Industry Integration Committees of the Army Ordnance Department," (unpublished Doctoral dissertation, University of Michigan, Ann Arbor, 1954).

³Ibid., p. 3.

by the forces of later circumstances, the pounding of painful experience, forged highly effective tools which can serve well in any industrial mobilization.⁴

Quick's analysis is illuminating. In effect, in the ammunition industry at the beginning of World War II there was no broad-based technology for the production of ammunition and other ordnance. In fact, it was virtually non-existent. What few prototypes existed, had to be models for the expanded industry. And production lines required complete retooling to be used for those products. To accomplish all of that in a coordinated fashion, the Army Ordnance Department originated a device for planning, management and control that it called the Ordnance Industry Integration Committee.⁵

The purposes of that committee were:

. . . to provide for the interchange between contractors of information regarding production techniques and processes, to consider and make recommendations with respect to problems of production and supply of materials and components, and to consider and recommend measures for the best integration of the facilities of the several manufacturers so as to obtain maximum efficiency in the utilization of such facilities.⁶ (My underlining.)

Quick cites time and tempo as the primary

⁴ Ibid., pp. 5-6.

⁵ Ibid., p. 6.

⁶ L. W. Campbell, Jr. in letter to Donald M. Nelson, Chairman, War Production Board. Ordnance Procurement Instructions 56, Washington: Office, Chief of Ordnance, 1942, p. 56A, as contained in George Stern Quick, op. cit., p. 6.

assets for distribution in a war or war planning economy and does not directly address the economic resource allocation problem. Yet it seems to be implicit in his writing.⁷ He recognizes that "in the effort to maximize production, it is necessary to make the most effective possible utilization of existing facilities and means."⁸ He uses an example of brake production in different factories to emphasize his point on best overall objectives and thus, unintentionally, drives home the necessity for economic resource allocation.⁹ He ends with a caution that emphasizes the ambivalence of the government toward cooperative ventures.

The type of cooperation and mutual exchange of information which would permit the result described above is only possible when the inter-relationships of manufacturers are very complete and close. Historically, such inter-relationships have been viewed with great suspicion by the government, which has seen in them an easy avenue to the establishment of monopolies and of concerted activities in restraint of trade.¹⁰

Suspicion on the part of government for industry was not a one-sided affair, but was fully reciprocated by the business community. When the Chief of Ordnance, Lieutenant General Levin W. Campbell, Jr. established a personal advisory staff of civilian business leaders in 1942, they enunciated the feeling in a letter to all corporations having contracts with

⁷George Stern Quick, op. cit., pp. 9-10.

⁸Ibid., p. 16. ⁹Ibid., p. 16. ¹⁰Ibid., p. 17.

the Army Ordnance Department. It read in part:

It is a simple statement of fact that for a long time Industry has felt that in its dealings with government it has in too few instances been able to deal with executives who both understood business and were sympathetic and appreciative of its accomplishments. Today no business leader could ask for more than is now available in the Ordnance Department.¹¹

Notwithstanding the mutual distrust, General Campbell was able to see the non-productive aspects of the situation. He set about to change that when he assumed the duties of Chief of Ordnance. The framework for cooperation was established when he determined that ". . . one of the primary policies of the Ordnance Department will be to secure the utmost cooperation and coordination with the industrialists upon whom we must rely to accomplish our objectives."¹²

General Campbell was successful in implementing that policy and establishing a sound relationship between the Ordnance Department and industry.

The industry integration committees contemplated by (him) were soon brought into being. Beginning with the formation of the

¹¹Excerpt from letter by Bernard M. Baruch, Lewis H. Brown, Benjamin E. Fairless and K. T. Keller to corporations having contracts with the Army Ordnance Department. From Levin H. Campbell, Jr., The Industry-Ordnance Team (New York: Whittlesey House, McGraw Hill Book Company, Inc., 1946), p. 8, as contained in George Stern Quick, op. cit., p. 36.

¹²George Stern Quick, op. cit., p. 34, taken from Levin H. Campbell, Jr., The Industry-Ordnance Team (New York: Whittlesey House, McGraw-Hill Book Co., Inc., 1946), p. 6.

Mechanical Time Fuze Committee on April 29, 1942, Ordnance Industry Integration Committees were quickly formed for almost every major item. On V-E Day there were 82 committees functioning, covering 162 types of Ordnance equipment and combining the efforts of 1,527 prime contractors and approximately 10,000 subcontract producers.¹³

The extent of that success can be garnered from a request to satisfy a legal question from the Chief of Ordnance to the Chairman of the War Production Board on April 29, 1942. That request also establishes the extent of manufacturer cooperation that is required for any successful co-production effort. The pertinent paragraph from the letter reads as follows:

The purposes of such committees shall be to provide for the interchange between contractors of information regarding production techniques and processes; to consider and make recommendations with respect to problems of production and supply of materials and components; and to consider and recommend measures for the best integration of the facilities of the several manufacturers so as to attain maximum efficiency in the utilization of such facilities. . . . Generally, the purpose will be to make commonly available to each manufacturer the benefit of the production experience and techniques of all manufacturers in the group, and so to integrate the facilities of the group as to attain maximum production in the shortest possible time.¹⁴

The extent to which this was carried out is reflected in a report by the Remington Arms Company

¹³George Stern Quick, op. cit., p. 43, taken from Levin W. Campbell, Jr., The Industry-Ordnance Team (New York: Whittlesey House, McGraw-Hill Book Co., Inc., 1946), p. 118.

¹⁴Ordnance Procurement Instructions 56, Washington Office of the Chief of Ordnance, 1942, p. 56 A1, as contained in George Stern Quick, op. cit., p. 50.

on its contribution to the war effort. That report stated that "technical information on all Remington processes, developments, engineering work, designs, etc. was made freely available to the Government and all members of the industry."¹⁵

The Industry Integration Committees of the Army Ordnance Department were formed to respond to a situation or outside force, the two-front war in Europe and the Pacific. They were children of necessity. The need for conservation of economic resources which spawned them was driven by the underlying need for political survival. They responded to those needs by reordering the traditional ways of doing business in America. Resource distribution was planned across industries rather than by being left to the crucible of market pricing. Government sentiment against cooperation among big businesses was swept aside and laws were modified in the interests of national security. Technology was shared among producers, old and new, large and small; and the pioneers in an industry were expected to teach the newcomers (technology transfer). Jigs, molds, blueprints, specifications and management techniques were shared so that an entire industry could coordinate production and turn out finished items of

¹⁵George Stern Quick, op. cit., p. 61. Taken from In Abundance and On Time, 1939-1943 (Bridgeport: The Remington Arms Company, Inc., 1944), p. 29.

war. Production bottlenecks for required parts were virtually eliminated. Efficiency, resource preservation and sufficiency in war materials were the goals that were established and met in this national cooperative scheme that pooled governmental and industrial resources.

When World War II ended the Industry Integration Committees of the Army Ordnance Department ceased to exist. America tried to return to business as usual. But the world had changed and new political realities didn't fit into old familiar ways of enterprise. New methods of dealing with national security were devised and the military assistance program (grant aid) came into being. We shall trace that development and see how the underlying goals of the Industry Integration Committees; efficiency, resource preservation and sufficiency in war materials; impelled the American defense establishment, unconsciously and unwillingly, toward offsets in international arms transfers.

Military Assistance Programs (Grant Aid)

The Truman Doctrine created the Military Assistance Grant Aid Program (MAP) in 1947 to assist other nations to meet the challenge of the Communist dictatorships of the left. This MAP program provided for the transfer of \$654 million of defense articles and services to our Greek and Turkish allies without any condition of repayment. The program was subsequently extended to include China and the Philippines. As the United States became involved in more collective security arrangements, the programs were expanded to include

NATO, the Rio Pact, SEATO, and ANZUS.¹⁶

The MAP program was itself a natural offshoot of the Lend Lease Program of 1941. Lend Lease was established during World War II to provide the sale, loan, lease, exchange or other disposition of any defense article to any government deemed vital to U.S. security. The original intent was for recipient governments to repay the U.S. in kind. During the course of the war it became increasingly evident that they would be unable to do so. As a result, the Truman Doctrine created grant aid.¹⁷

Nineteen hundred and forty-nine was an important year for United States foreign military assistance (FMA) policy. Foreign military sales were authorized in that year to allies who could afford to purchase defense items. It was also the year that the North Atlantic Treaty Organization (NATO) came into being and expanded the use of grant aid. "The Mutual Defense Assistance Act of that year authorized grant military aid for countries considered vital to our own

¹⁶James T. Coleman, et al., "On Some Aspects of Foreign Military Sales." (Unpublished research report, Air Command and Staff College, Air University, Maxwell AFB, AL., 11 May 1975), p. 2.

¹⁷Jack Lester McChesney, "The Evolution of the Foreign Military Sales Program and Its Impact on Defense Procurement Policies and Procedures." (Unpublished Doctoral dissertation, George Washington University, 1976), pp. 51-52.

security and also permitted sales of equipment to other friendly nations."¹⁸

This arrangement continued until the late fifties when several events indicated the need for a change. The biggest need for change was brought about by a growing deficit in the U.S. balance of payments. Other events that hastened the need for a change included the depletion of U.S. surplus military property, a change in many American attitudes toward the "give away" programs, and the economic recovery of Western Europe.¹⁹

The Stockholm International Peace Research Institute (SIPRI) "noted that, until 1962, nearly all weapons supplied to third world countries by the U.S. were provided without charge. 'After 1962 there was an increased emphasis on the sale of weapons, but the policy governing these sales was not significantly different from that governing the gift of weapons.'"²⁰

Even though the authorization to sell military equipment had existed since 1949, nearly all MAP expenditures prior to 1961 had been grant aid with little or no financial reimbursement to the United States.²¹ Many nations were still unable financially to purchase equipment in the 1950's. In addition, the pricing

¹⁸ Ibid., p. 52.

¹⁹ James T. Coleman, et al., op. cit., p. 2.

²⁰ Jack Lester McChesney, op. cit., p. 29, with excerpt from Stockholm International Peace Research Institute, The Arms Trade with the Third World (Stockhold: Almqvist and Wiksell, 1971), p. 135.

²¹ James T. Coleman, et al., op. cit., pp. 2-3.

procedures in effect during that period required the foreign governments to pay current replacement costs for items already in the U.S. inventory.²²

With the passage of the Foreign Assistance Act of 1961 (P.L. 87-195), and subsequent emphasis on (military assistance sales) MAS, the Department of Defense was quick to establish the International Logistics Negotiations Office to promote sales of defense articles. The office pursued a vigorous brand of salesmanship, participated in international trade shows, arranged credit for purchasing nations, subsidized interest rates, secured loan guarantees from the DOD, and assisted in getting the Export-Import bank to provide credit. The philosophy was keyed to making the sale and then providing a means for the country to make reimbursement on terms that were sufficiently possible to encourage the purchasing nation to participate.

These efforts resulted in a rapid growth in foreign military sales. In 1961, the MAP appropriation was \$1,800 million and MAS amounted to \$327 million or about 19 percent of MAP. By 1964, the MAP appropriation had been reduced to \$1,000 million and the MAS increased to \$804 million.²³

The grant aid program was and is efficient in distributing defense items to those locations where American foreign policy has established a need to maintain a military presence and a defensive posture. In the past it has also ensured a sufficiency of war materials at the right place and at the right time. But with the disappearance of American military equipment surpluses and the developing international demand

²²Jack Luke McChesney, op. cit., pp. 52-53.

²³James T. Coleman, et al., op. cit., p. 3.

for first line defense items, that sufficiency is no longer assured. The grant aid program has always fallen short from the perspective of American resource preservation. On an international scale the absorption of U.S. surpluses preserved global resources. But on the national scale, grant aid gives away materials that have consumed resources with no tangible return to the citizenry. To stop that drain the Office of International Logistics Negotiations established these objectives:

1. Promote the defensive strength of our allies, consistent with our political-economic objectives.
2. Promote the concept of cooperative logistics and standardization with our allies.
3. Offset the unfavorable balance of payments resulting from essential U.S. military deployment abroad.²⁴

These objectives were implemented through the Foreign Assistance Act of 1961 and contributed to the decline of the grant aid program and the development of foreign military sales (FMS).

Foreign Military Sales

Transition from Grant Aid

A considerable amount of planning and coordination between the customer and the U.S. is required to effect a smooth transition to FMS. There are basic differences between Grant Aid operations and FMS which the customer must fully understand. The

²⁴Jack Lester McChesney, op. cit., p. 54.

customer must realize that he is now going to be paying all of the costs to support his equipment. This means that the customer must develop a reliable system of determining his requirements; stock levels, reordering points, and excesses now become even more vital if he is to spend his funds wisely.

A second consideration is transportation. No longer will the U.S. military departments deliver his purchases to him. The customer must make his own arrangements to have his requirements delivered. This is done by means of a Freight Forwarder. A Freight Forwarder is a transportation agent within the U.S. who receives shipments from the military departments and makes the necessary arrangements to ship them to the customer. Normally the Freight Forwarder is obtained through the customer's embassy in Washington, D.C. The Freight Forwarder must be obtained prior to completing an FMS case.

The customer is also responsible for several other functions which may have been performed for him by the (military advisory and assistance group) MAAG under Grant Aid. These include maintaining status and following up on requisitions, preparing and negotiating claims for damaged or short shipments, and reconciling deliveries with billings.

In addition the customer must obtain an export license.²⁵

It is evident from the preceding description of changes in operation required by a transition from grant aid to foreign military sales that aside from national pride there is no impetus for receptor nations to change over to foreign military sales. The economic costs preclude it. The necessary impetus was provided by a policy change by the U.S. Government toward grant aid that started with the Foreign Assistance Act of 1962.²⁶ The Nixon Doctrine, enunciated in 1969, called

²⁵James T. Coleman, et al., op. cit., pp. 102-103.

²⁶Lynton T. Winn and James J. Dunlop, "Foreign Military Sales Legislation: Impact on the Achievement

upon the United States' allies to assume a larger part of the burden of common defense. "A key tenet of that doctrine is that 'in cases involving other types of aggression (i.e., non-nuclear) we shall furnish military and economic assistance when requested and as appropriate. But we shall look to the nation directly threatened to assume the primary responsibility of providing the manpower for its defense.'"²⁷ Friendly foreign countries and allies were put on notice that they would have to defend themselves. That meant they had to have conventional arms and to get them they would either have to build them or buy them.²⁸

The basis for changing the thrust of foreign assistance had been set a year earlier in the Congress with the passage of the Foreign Military Sales Act of 1968. That act was passed "as a direct result of Congressional dissatisfaction with the then existing state of affairs" (i.e., grant aid).²⁹ Changes

of United States Foreign Policy Objectives and Its Implication for the Department of Defense." (Unpublished Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1975), p. 15.

²⁷ William D. McLaren, United States Defense Industry Guide for Conducting Business With NATO Organizations and Member Countries. (Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1971), p. 56. See also John R. Young, "Program Management for Foreign Military Sales." (Unpublished research report, Defense Systems Management School, Fort Belvoir, Virginia, 1975), p. II-1.

²⁸ James T. Coleman, et al., op. cit., p. 18.

²⁹ Jack Lester McChesney, op. cit., pp. 54-55.

continued throughout the Nixon Administration. Management of security assistance was reorganized in both the State and Defense Departments.

Some organizational consolidations were made, such as the establishment of the Defense Security Assistance Agency to administer both grant aid and sales programs, and it was made clear that foreign military sales were to be substituted for grant aid as rapidly as possible in support of the Nixon Doctrine.³⁰

U.S. Policy

The basic USG policy for foreign military assistance is to aid friendly foreign countries in:

1. Maintaining an adequate defense
2. Maintaining non-dictatorial internal security
3. Maintaining economic stability
4. Resisting aggression

The basis for this policy is that world peace is enhanced by secure and economically stable countries. In turn these stable countries are an essential element in the overall security and well-being of the U.S. Another element of the policy is that the FG will become militarily self-sufficient over a period of time. As such it is desired that the FG determine its military posture with minimal USG guidance.³¹

To support that basic policy the United States has developed, considered and adopted legislation over the years.

As stated in the grant aid section of this chapter, volume sales of military equipment by the United States government began in World War II under the authority of the Lend Lease Act of 1941. Following

³⁰Ibid., p. 55.

³¹John R. Young, op. cit., pp. II-2 and II-3.

World War II, however, and well into the decade of the 1950's, most U.S. assistance actions were grant aid. The Economic Cooperation Act of 1948 (Marshall Plan) was of that genre. Military assistance and security was no different and a proliferation of acts resulted. Starting in 1949, the first of a series of mutual defense acts, The Mutual Assistance Defense Act of 1949, was passed. In 1952 the name was changed to The Mutual Security Act and in the 1954 act, Congress provided for the control of export licenses for arms, ammunition and the implements of war.³² On 4 September 1961 The Foreign Assistance Act of 1961 was enacted to replace all existing foreign assistance legislation and to completely revise the basic guidelines for the conduct of military and economic assistance.³³

The Foreign Assistance Act of 1961 broadened the provisions under which the U.S. could sell military hardware to foreign nations. The primary theme of subsequent legislation until 1965 was the promotion of FMS as the U.S. attempted to reduce its commitment to grant aid and to encourage recipient nations to transition from aid to sales. In encouraging sales, however, Congress made it clear in 1962 legislation that DOD would not compete with industry in the FMS program. In 1964, Government support of credit financing was expanded by allowing Government guarantee of private financing arrangements. This provision was directed at assisting grant aid recipient countries to transition to sales. Congress in 1964 also relaxed the terms of payment for cash sales by allowing the

³²Lyndon T. Winn and Jack J. Dunlop, op. cit., pp. 11-12.

³³Ibid., p. 13.

customer country a period of 120 days from delivery in which to make payment. In 1965 a revolving fund was established from which DOD could guarantee the financing of credit sales. Congressional concern over the extent to which DOD used the revolving fund resulted in its abolition in 1967.³⁴

Throughout the period 1961 to 1967 regional ceilings on aid were continued or introduced as part of U.S. foreign policy. . . .

Legislation in 1967 reflected Congress' concern that little attention had been paid to legislative restrictions by those who administered the FMS program, and that Congress had little control over the course that the FMS program was taking in relation to the volume and direction of sales. Additional restrictions were introduced which prohibited credit sales of sophisticated weapons to developing nations, placed limitations on assistance to countries which made "unnecessary military expenditures," and restricted transfer of U.S. furnished arms to third nations. Legislation was also enacted directing periodic reports under the FMS program.³⁵

By 1968 FMS had become significant enough that separate legislation was enacted wherein sales were broken out from the larger subject of foreign assistance. Of primary concern at this time were the less-developed countries that were the major recipients of military credit sales. In a broad sense, the restrictive provisions in the original act were directed toward these countries. Such provisions included restrictions on purchase of sophisticated weapons, sources of credit, and usage of arms, as well as regional sales level ceilings.³⁶

³⁴Ibid., p. 31. For additional information on the development of credit sales see also Leroy J. Haugh, International Logistics: Foreign Military Sales (Washington, D.C.: Industrial College of the Armed Forces, 1967), pp. 8-9.

³⁵Lynton T. Winn and Jack J. Dunlap, op. cit., pp. 31-32. For an in-depth discussion of the restrictions and applications of the Foreign Assistance Act of 1961, see also pp. 14-15 of the above reference and James T. Coleman, et al., op. cit., pp. 22-26.

³⁶Ibid., p. 71.

The separate legislation referred to was the Foreign Military Sales Act of 1968. It was given as proposed legislation to the Congress by the Secretary of State. Its purpose was to clarify the goals, authorizations, restraints and controls governing the administration of foreign military sales. It was adopted by Congress and enacted into law. The primary restriction of the law was that any sales to another country had to be consistent with the foreign policy interests of the United States. It contained other major restrictions as well. They included:

1. No sales to military dictators (Presidential waiver allowed)
2. Secretary of State responsible for continuous supervision
3. Sale must promote security of the U.S.
4. No transfers of materials to third countries without Presidential approval
5. Disqualification of countries that seized U.S. fishing vessels outside 12 mile limit
6. Sales for defensive purposes only
7. Commercial sales desired over government to government
8. Special emphasis on procurement of U.S. goods.³⁷

After 1968, Congressional FMS activity was affected by the tendency of Congress to act slowly, or not at all, in any given year. . . . Nevertheless, the Foreign Military Sales Act Amendment of 1971 was passed 31 December 1970. This bill added some restrictions on F-5 sales, munitions list controlled items, and item transfers to third countries, but loosened the provision concerning seizure of U.S. fishing boats. The bill also was the last separately

³⁷James T. Coleman, et al., op. cit., pp. 26-31. See also Lynton T. Winn and Jack J. Dunlap, op. cit., pp. 36-39.

legislated FMS amendment as subsequent ones were always part of the annual Foreign Assistance Act.³⁸

Buy America Act

A policy must be mentioned at this point which receives only oblique attention in most of the writings on foreign military sales. Yet, it has an underlying impact on the entire direction of U.S. participation in the FMS market. That it had a greater conscious impact abroad than in the United States seems obvious. Europeans were "much aware of the rapid American switch from patron saint of the mid-1950's to most-active competitor of the early 1960's."³⁹

From about 1959-60 onwards, an important change became apparent in the nature and scope of United States military aid to its NATO partners which, although its effects were not seen overnight, is leading to a gradual phasing-out of material aid to all but a limited number of countries. The first types of aid to disappear were Off-Shore purchases and budgetary assistance. This was followed by transferring to the countries concerned responsibility for the procurement of spare parts for maintenance of equipment delivered under earlier aid programmes.⁴⁰

³⁸ Lynton T. Winn and Jack J. Dunlap, op. cit., pp. 71-72.

³⁹ Elliott Vandevanter, Jr., International Logistics: Interallied Collaboration in Weapons Production (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 40.

⁴⁰ David Bandall, "Burden Sharing in NATO," NATO Letter, Paris, September 1963, as contained in Elliott Vandevanter, Jr., op. cit., pp. 40-41.

This policy was the Buy America Act of 1933. Provisions of this Act had been neglected during the World War II years and afterwards. Under the Lend Lease Act of 1941, American equipment was sent to foreign nations in ever-increasing amounts and foreign purchases were minimal. Later, under the Economic Cooperation Act of 1948, the door was opened for foreign purchases to assist the recovery of World War II allies. With the passage of the Foreign Assistance Act of 1961, the provisions of the Buy America Act were re-emphasized:

The Buy America Act of 1933 (41 U.S.C. 10a-d) established a government-wide procurement policy to restrict contract awards for foreign articles, materials and supplies. Within the DOD, the Act is implemented through the ASPR (Armed Services Procurement Regulations) gold flow rule which applies a fifty percent price differential factor in evaluating items of foreign origin. Executive Order 10582 provides that an item is of foreign origin if the cost of foreign components exceeds fifty percent of the total cost.⁴¹

"The Buy American Act is primarily concerned with restricting foreign goods and supplies."⁴² DOD extended the restrictions to services through the ASPR, Section VI, Part 1.⁴³ However, the Buy America Act does not preclude all purchases abroad. As provided

⁴¹Jack Lester McChesney, op. cit., p. 147.

⁴²U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries (Washington, D.C.: Report to the Congress, 1973), p. 20.

⁴³Jack Lester McChesney, op. cit., p. 94.

in Executive Order 10582, if the foreign content of an item is less than 50% of its value, "it is considered a domestic end-item and no restrictions apply. . ."⁴⁴ This policy is also caveated in that the Secretary of Defense is permitted to waive it in the interests of national security. Also, a waiver is not normally necessary for a foreign military sale since the Act does not apply to items purchased for use outside of the United States.⁴⁵

The Buy America Act reflects United States policy and was, until January 1981, the guiding philosophy provided by the Congress. However, the Department of Defense became aware that military sales may create economic problems for recipient nations if steps are not taken to ease their balance-of-payments problems. As early as 1966, then Secretary of Defense Robert S. McNamara acknowledged that problem when he said:

. . . I think it should be clear to all that our future ability to negotiate additional sales programs will depend, at least in part, on our demonstrated willingness to make some reciprocal

⁴⁴U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries, op. cit., p. 20.

⁴⁵Ibid., p. 20. See also Jack Lester McChesney, op. cit., p. 151.

purchases where foreign equipment is competitive in price, quality, and delivery schedules.⁴⁶

However, ten years later, at the 1976 International Conference on Procurement and Grants Management, Lieutenant General Howard M. Fish in a speech on coproduction and offset arrangements had to say the following:

The DOD may assist in implementing the offset arrangement by waiving certain "buy American" preferences for prime contracts so that foreign contractors may compete on an equal footing with American companies. This means that for direct government procurement it may waive the "Buy American" and Gold Flow price differentials (50%) and duty. Such determination is by no means automatic for all offset agreements, but will be made on a case-by-case basis taking into account foreign policy, national security, and economic factors involved.⁴⁷

As the foreign military sales market expanded and as other cooperative arrangements in research, development and production were reached, the U.S. "buy American" policy came increasingly into question. In the current period of inflationary prices, as other nations' concern about national industrial bases and balance of payments escalated, the "Buy America Act" had to be modified to meet the demands of changed market conditions.

⁴⁶Leroy J. Haugh, op. cit., p. 29. Excerpt from Statement of Secretary of Defense Robert S. McNamara, 8 March 1966, before the House Armed Services Committee, on the 1967-71 Defense Program and FY 1967 Defense Budget. Hearings on Military Posture (89th Cong., 2d sess., Washington: U.S. Government Printing Office, 1966), p.7325.

⁴⁷Howard M. Fish, op. cit., p. 23.

Balance of Payments Implications

International cooperative research and development programs, if indiscriminately undertaken, can adversely affect the balance-of-payments situation--dollars will leave the country. DOD policy provides that preference be given to those programs in which adverse balance-of-payments effects can be minimized or avoided. Some of our allies also appear to take this view regarding their own balance of payments. Thus balance-of-payments considerations have become a crucial negotiating point in determining cost- and effort-sharing arrangements on cooperative programs and could be an obstacle to starting programs.⁴⁸

In addition, as Hunter points out, cooperative programs, if not carefully structured can erode the national employment base.⁴⁹

"The large military grant aid programs of the past and the stationing of U.S. troops overseas have both contributed significantly to balance of payments deficits."⁵⁰ Within both the Departments of State and Defense, responsible officials have been sensitized to this dilemma. Within the Defense Department, particularly, the push for military sales as opposed to grant aid, has been vigorous. This stance has found

⁴⁸U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries, op. cit., p. 16.

⁴⁹George Fletcher Hunter, "An Evaluation of USAF Cooperative R&D" (unpublished research report, Defense Systems Management School, Fort Belvoir, Virginia, 1975), p. 10.

⁵⁰David L. Morse, "Economic Issues in Foreign Military Sales" (unpublished research paper, Naval War College, Newport, Rhode Island, 1975), p. 14.

favor among concerned law-makers.⁵¹

Balance of payments considerations are but one aspect of the economic advantages to arms sales. But, due to moral overtones that aspect is often the only one justified. As Morse states, "that should not be surprising. To argue that the United States enjoys financial benefits from the sale of weapons invites the charge of being 'Merchants of Death.'"⁵² References are also made to the national employment base. But rarely are details provided. So sensitive are the law-makers to this issue that a detailed discussion of economic advantages is hardly to be found in the literature. Yet the economic advantages of foreign military sales are many and they have a large monetary value. Only piecemeal evaluations have been performed in the past. In one example cited by Morse, 53% of the U.S. Army's FY 75 procurement budget was allocated to foreign military sales.⁵³

Still, balance of payments is an economic issue. And when it is used to justify arms sales, the underlying reasons are gold flow and national profits. This aspect has required apology from State Department

⁵¹Ibid., pp. 14-15. See also Jack Lester McChesney, op. cit., p. 55.

⁵²David L. Morse, op. cit., p. 10.

⁵³Ibid., pp. 10-12.

personnel in the past. In 1970 Undersecretary of State for Political Affairs, U. Alexis Johnson while appearing before the Senate Foreign Relations Committee felt compelled to say the following:

Let me address here the assertions that we should be or are selling arms because it is good for business and is beneficial to our balance of payments. That such benefits do accrue from arms sales abroad is indisputable, just as they accrue from any export sale. But on this issue the Administration and the Congress are of one mind: we do not and will not approve the sale of arms to other countries primarily for those reasons. This is made quite explicit in the statement of 'U.S. Policy and Responsibility for Military Export Sales,' which has been furnished to the committee. Because we do not permit military exports primarily for balance-of-payment reasons and because we exercise rigorous supervision of the military sales we do make, I believe our policies do contribute to control of the international arms trade.⁵⁴

To minimize balance of payments problems nations have been devising new ways of doing business. One method that has begun to find favor among foreign governments is the offset technique. Costs and efforts are so allocated that outflows are balanced by inflows.⁵⁵ Foreign governments are beginning to expect this type of arrangement. As Haugh tells us:

⁵⁴Ibid., p. 15, as taken from U.S. Congress, Senate, Committee on Foreign Relations, Hearings on S2640, S3429, and H.R. 15628 to Amend the Foreign Military Sales Act, 91st Congress, 2d Session, 24 March and 11 May 1970, p. 4.

⁵⁵George Fletcher Hunter, op. cit., p. 10. See also U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries, op. cit., p. 16.

Notwithstanding that one of the specific goals of foreign military sales is to reduce the unfavorable balance of payments, other aspects of international logistics, such as co-production and mutual development, point the way toward a more truly international military market, where the United States will be both a customer and a seller. Such an eventuality need not set back the U.S. balance-of-payments objectives, for purchases of military equipment from allies could be offset by greater purchases on their part, either of military equipment or of civilian goods.⁵⁶

As we compare foreign military sales to the activities of the Industry Integration Committees of the Army Ordnance Department during World War II, we see that the foreign military sales are indeed supportive of national goals of efficiency, resource preservation and sufficiency of war materials. However, a new element must be considered since the resource utilization must be evaluated from an international perspective. Foreign governments in entering into agreements with the United States did not find the resource preservation goal satisfied from their point of view. In an effort to satisfy their balance-of-payments requirements the pressure for offsets was intensified.

⁵⁶Leroy J. Haugh, op. cit., p. 29.

Offset Agreements In International Arms Transfers

Coleman tells us that, "co-production of weapon systems is becoming an ever increasing part of the U.S. Foreign Military Sales (FMS) program."⁵⁷ He expands further on the subject in saying, "since co-production is a part of FMS, specific approval must be obtained from key U.S. Government agencies."⁵⁸ Guidelines for coproduction arrangements for those agencies were covered in a 1973 memorandum from the Undersecretary of State for Security Assistance and covered three areas: military considerations; economic, financial and commercial considerations; and political considerations.⁵⁹

The existence of a governmental memorandum describing conditions for conducting business in this fashion gives substance to this method. But the compelling reasons for arms seeking nations to desire offsets have not been established. Hall and Johnson establish that rationale:

A country seeking new weapons for its military has three alternatives. It can buy the items from a foreign manufacturer, it can design and produce

⁵⁷ James T. Coleman, et al., op. cit., p. 114.

⁵⁸ Ibid., p. 115.

⁵⁹ Ibid., p. 115.

its own systems, or it can engage in co-production. Many countries object to the importation of weapons even if comparative economic advantages favor foreign producers. The arguments for national self-sufficiency in weapons are several and diverse.

Domestic production, it is argued, simplifies maintenance and operational support of military equipment, and assures a wartime supply. A recent and highly popular argument is that there are important technological and economic spill-overs to the other sectors of the economy from military technology. Furthermore, local production of weapons may be desired for balance-of-payments reasons. This factor has become increasingly important as international trade in weapons has changed from primarily grant aid to cash sales.

All these arguments involve military or economic considerations. Powerful political forces often lead to a desire for local weapons production; or perhaps it is more correct to say that local weapons production is frequently a politically feasible way to achieve some economic or military goal. Foreign produced weapons do not have the same political implications as nationally produced weapons. Importation of military hardware can jar nationalistic sensitivities and arouse feelings against the country of origin in a way that locally produced weapons do not. Local production further tends to enlist the support of the business community.⁶⁰

Political Considerations

Franklin R. Root in exploring political risk in international business developed models for analyzing the risk involved for multinational businesses. While his analyses are not fully applicable here because of the usual participation of governments at both the ministry of state and ministry of defense level, his

⁶⁰G. R. Hall and R. E. Johnson, "Aircraft Co-Production and Procurement Strategy" (unpublished research report, Santa Monica, California: Project Rand, 1967), pp. 181-182.

research does have some applications. Root says the following:

Political analysis is a method of inquiry that seeks to explain the political behavior of a host country and its consequences for the international enterprise. It goes beyond the 'what' of information to get at the 'why' of change or stability, and it is directed towards the detection and measurement of causal factors and their mutual interdependence.⁶¹

A full analysis of political uncertainty, therefore, must seek not only to detect and measure economic and social changes that will compel a response by the host government but also the government's capability to make a specific response.⁶²

Root's models for analysis are directed at the important questions for the multinational firm of operational restrictions, transfer of resources and probabilities of exclusion or expropriation. Yet, offshoots of some of those same questions concerning stability, political economic risks and political social risks need to be addressed in attempting to determine whether or not a specific offset proposal has a high likelihood of implementation.

Initially, however, the question must be asked, how do countries make the decision to enter

⁶¹Franklin R. Root, "Analyzing Political Risks in International Business," The Multinational Enterprise in Transition, ed. Kapoor, A. and Phillip D. Grub (Princeton, N.J.: The Darwin Press, 1972), p. 356.

⁶²*Ibid.*, p. 358.

into codevelopment or coproduction agreements? Hall and Johnson in their study of aircraft coproduction and procurement strategy examined the process used by the Japanese in seeking coproduction agreements on the T-33A, F-86 and F-104J.

From the viewpoint of the nation that is to coproduce an aircraft developed in another country, a program begins with two decisions: a politico-military decision that its defense posture requires a new weapon system, and a political or economic decision that manufacture but not development will be done locally.

The next step is to decide what system to acquire. Sometimes . . . the acquiring country may have a strong predisposition and shopping will be perfunctory. In other cases . . . the competition among suppliers of possible alternatives may be intense.

While the system selection process is underway, the licensee prime contractor must be chosen. This choice is the responsibility of the purchasing government and often reflects local political and economic considerations. Foreign firms occasionally become involved to some degree in source selection, since the purchasing government may request a survey of domestic manufacturing capabilities and requirements. If the nation already has an aircraft industry, such a survey is straightforward; but if the co-production effort is the first of its kind, the assessment may be complex.⁶³

Hall and Johnson also examined the decision to enter into a coproduction agreement from the perspective of the supplier nation, in this instance the United States.

⁶³G. R. Hall, and R. E. Johnson, "Aircraft Co-Production and Procurement Strategy: A Report Prepared for United States Air Force Project Rand." (Rand Corporation research report, Santa Monica, California, 1967), p. 75.

From the U.S. point of view, the major benefit of co-production is political. Co-production permits the use of local economic and political pressures to achieve mutual defense goals. In situations where the United States wants its allies to increase their defense capabilities or bear more of the expense of a defense posture, U.S. arguments may be more persuasive if the necessary hardware can be produced by the allies themselves. The U.S. goals of economic development in other countries may also be furthered by encouraging a local defense-goods industry. The United States, moreover, reaps some benefits from the maintenance and operational facilities available in other countries as a result of their production activities.⁶⁴

Based upon their research that found coproduction to be more expensive than direct sales, Banas and Reid found additional politically expedient reasons for entering into coproduction agreements.⁶⁵ They said:

. . . In general, when an aircraft coproduction program is undertaken by a foreign country, that country must purchase certain expensive tooling and equipment to fabricate and/or assemble the aircraft. Purchase of the tooling would not have been necessary had a finished product been bought. Therefore, the country must decide if benefits derived in a coproduction program justify the increased cost of the product or, in the case of a fixed budget, a lesser number of aircraft.

Different governments will decide differently for different reasons. One reason for a government electing to go the route of coproduction is that it can then point out to the people it governs how many new jobs have been created and how

⁶⁴ Ibid., p. 183.

⁶⁵ John M. Banas, and James R. Reid, "A Case History of the Coproduction of the F-5E Aircraft by the United States of America and the Republic of China." (Unpublished Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio, 1975), pp. 99-100.

technical capacity has been advanced in their country. Another viable reason is the economic advantages that could be derived by coproduction. Aircraft design, test and initial tooling costs are high. These costs are amortized over the number of aircraft produced. If a larger number of aircraft are built, the per unit cost will naturally be lower. Both the United States and an allied country could profit from a coproduction program if, for instance, the United States wished to acquire a number of a certain aircraft and an allied country also wished to acquire a number of the same aircraft. If enough aircraft were produced to offset the country's tooling costs, economic arrangements could be made between the United States and an allied government to have a net gold flow slightly in favor of the United States, a zero net gold flow, or even a gold flow slightly in favor of the other producing country. Yet both governments could profit from the coproduction program.⁶⁶

Another political consideration that governments must face is the acceptance of foreign weapons systems by their populations. Coleman had this to say about acceptance of arms transfers:

. . . In Japan and other countries, the importation of military hardware can jar nationalistic sensitivities and arouse feelings against the country of origin in a way the locally produced weapons do not. Local production further tends to enlist the support of the indigenous business community. The Japanese view of the F-104J's as Japanese, not American, made the Government's defense policies more politically acceptable.⁶⁷

⁶⁶ Ibid., pp. 100-101.

⁶⁷ James T. Coleman, et al., op. cit., p. 138. For additional information on Japanese acceptance of coproduced weapons, see G. R. Hall and R. E. Johnson, op. cit., p. 188.

Because of this sentiment for home produced goods, a government may find it necessary to nurture and/or protect a home industry. Government orders may even be vital to the survival of an industry and the protection of the employment base and certain skills, even if the industry supported is not efficient. Coproduction is then the only option for a technology exporting nation.⁶⁸

Having explored the politically based reasons for nations to enter into codevelopment or coproduction agreements the next question that rises to pre-eminence is what other political factors are important to the likelihood of a successful agreement. Hall and Johnson have some specific words on the question:

The U.S. prime contractor may carry out its part of the program under a contract with either The U.S. Government or the co-producer.

Contractual arrangements for co-production programs are simpler when there is no direct governmental sponsorship. . . . Only a contract between the two firms is required and the Government merely approves the export of technology and parts.

The numerous treaties, licenses, and contracts required for a co-production program all have a common purpose: to indicate the technology to be transferred, how it is to be transferred, the payment for the technology and the goods and

⁶⁸Elliott Vandevanter, Jr., International Logistics: Interallied Collaboration in Weapons Production (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 36.

services required to transfer it, and the payment for any other goods and services required to produce a finished product.⁶⁹

Licenses and contracts are essential economic and legal considerations. But the number one consideration mentioned by Hall and Johnson, "treaties," was a political consideration. Throughout the history of foreign aid and arms transfers this has been important. Speaking of the European Recovery Plan (ERP) in 1952, Behrman noted:

The close tie of ERP with political and military considerations was pointed out immediately when some Congressmen expressed concern that war might be precipitated through efforts of the Communists to thwart the program's objectives of economic and political stability in Europe.⁷⁰

Cornell explored the importance of the treaty in his analysis of the role of NATO in collaborations for weapons coproduction. He reported the following:

It is in the vital function of getting everyone interested and informed who may have a similar requirement that NATO has been of real assistance. The present NATO organization and process provides the place and opportunity for its members to study each other's needs,

⁶⁹G. R. Hall and R. E. Johnson, op. cit., p. 77.

⁷⁰Jack Behrman, "Foreign Aid as a Technique in Attaining United States International Economic Objectives." (Doctoral dissertation, Princeton University, 1952), p. 71.

and the day-to-day contacts and milieu in which they can talk freely, both informally or formally, to consult, argue, exchange ideas and techniques, and to reach agreement. The very fact that each is made aware of the other's intentions and needs is a significant move toward cooperation on all matters of mutual interest. Cooperative organization habits are being added to continuously and taking firmer root among the members by the interplay of ideas and agreements to undertake joint tasks. Above all, increased mutual respect and trust are fostered by the proof that they have been able to work together. Sovereignty does not seem to have suffered much, nor has the "pocketbook" of any that have chosen to pursue common objectives together.⁷¹

Treaties seem, then, to be important to the likelihood of implementation of codevelopment and coproduction because they reduce the area of unknown objections that different governments and their prime contractors may raise in working with each other. They increase the familiarity of experience among or between potential coproducers. Hall and Johnson have shown us some of the compelling political reasons to seek coproduction from the point of view of both the technology exporting and importing nations. According to the Comptroller General, other political reasons, less compelling, are assessed in exploring the decision to engage in codevelopment or coproduction:

⁷¹Alexander H. Cornell, "An Analysis of International Collaboration in the Organization and Management of Weapons Coproduction." (Doctoral dissertation, American University, Washington, D.C., 1969), p. 697.

Political considerations of FMS the State Department assesses include:

- What role the country plays in its surroundings, what interests it has in common with the United States, and where U.S. interests diverge.
- Whether the transactions will do more to further U.S. objectives on balance than other economic or political measures.
- The position of influence the sales might help to support, including the potential restraint that can be applied in conflict situations.
- Whether a particular sale will set a precedent which could lead to further requests for arms or for similar requests from other countries.
- The current internal stability of the recipient country, its capacity to maintain the stability, and its attitude toward human rights.
- The possible adverse impact on U.S. relations with a friendly government of not making the sale.
- The options available to the recipient country. Will a refusal result in the country's turning to other sources of supply? What sources? What will be the political, military, and economic implications of this? If a country has options that it will unhesitatingly employ, would our refusal to sell mean the forfeiting of opportunities to develop or maintain parallel interests and objectives.⁷²

⁷² U.S. Comptroller General, Foreign Military Sales--A Growing Concern. (Report to the Congress, Washington, D.C., 1976), p. 13.

These political considerations paint a picture of the concerns that must be addressed in evaluation of a proposal for codevelopment and/or coproduction, but leave the question of how do we address them? That question leads us back to the work of Franklin R. Root and his models for analyzing political risk.

Root defined political analysis as "a method of inquiry that seeks to explain the political behavior of a host country and its consequences for the international enterprise."⁷³ He determined that in political analysis there are two classificatory schemes, political/economic and political/social that can help to determine the why of change or stability.⁷⁴ "Political/economic risks are associated with the actions of a host government that are primarily a response to largely unanticipated internal and external changes in the national economy."⁷⁵ In contrast, he shows that political/social risks cannot be explained in economic terms. As an example, ownership-control changes develop from responses to nationalism or ideology and not from economic considerations.⁷⁶

⁷³Franklin R. Root, op. cit., p. 356.

⁷⁴Ibid., p. 357.

⁷⁵Ibid., p. 357.

⁷⁶Ibid., p. 358.

The distinction between political/economic and political/social uncertainties and risks is helpful in the analysis of host government behavior because two different sets of models are appropriate. The assessment of political/economic risks is primarily dependent on concepts and models drawn from economics while the assessment of political/social risks depend on concepts and models drawn from political science, sociology, and psychology. Unfortunately, the latter fields fall far short of economics in the availability of operational models that are useful to the international manager. For this reason, the forecasting of political/social risks is much less sophisticated than the forecasting of political/economic risks.⁷⁷

The model that Root uses to assess political/economic risks is an aggregate model that links economic stability and instability, balance of payments disequilibrium and adjustment, and the foreign exchange market. It both starts and ends with government action. (See Figure 1).⁷⁸

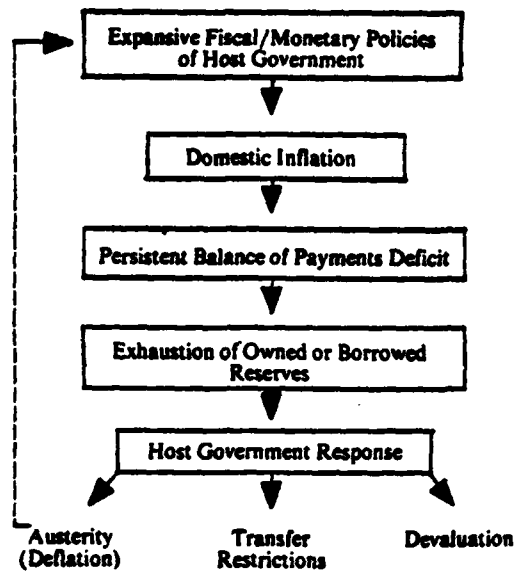
The sequential steps of the model are as follows: (1) expansive fiscal/monetary policies of the host government cause, (2) inflation that, in turn, causes (3) a persistent deficit in the balance of payments (mainly via higher imports) that compels (4) remedial government action to remove or suppress the deficit. Although this model does not forecast the specific adjustment policies of the host government, it does indicate the policy options: austerity, transfer restrictions, and devaluation.⁷⁹

⁷⁷Ibid., pp. 359-360.

⁷⁸Ibid., p. 360.

⁷⁹Ibid., p. 361.

Figure 1 . A Political/Economic Risk Forecasting Model



*Model from Franklin R. Root, "Analyzing Political Risks in International Business," in A. Kapoor, et al., ed., The Multinational Enterprise in Transition (Princeton, N.J.: The Darwin Press, Inc., 1972).

The model that Root uses for analyzing political/social risks, he labels as crude. His research showed that political scientists are just ". . . turning towards an analysis of political systems to explain the forces of instability, change and modernization in developing countries. With isolated exceptions, however, their models are conceptual and verbal rather than operational and quantitative."⁸⁰

Root adopted Roy C. Macridis' definition of a political system for his purposes. It is defined "as a set of actors who perform a social function that involves 'deliberation and decision-making for the purpose of providing adjustment and reconciliation of the all-prevailing aspirations.'"⁸¹

. . . Relationships among four elements of this system--decision-making, power, ideology and institutions--make up the political process which is the transformation of conflict among interest groups into authoritative (official) decisions.

Decision-making is the most universal function of a political system. Political decisions are made by official organs of the state with the expectation they will be obeyed. In analyzing decision-making in a particular political system, questions such as these are pertinent: Who makes political decisions? How are these decision makers selected? What is the composition of the political elite? How are decisions made? By tradition? By a charismatic leader? By rational deliberation? . . .

⁸⁰Ibid., p. 362.

⁸¹Ibid., p. 362.

Power refers to the intent and capacity of a group or individual to control or influence the behavior of others. Every political system has a power configuration, a distribution of power among organized social groups. . . . Key questions relating to power are as follows: What is the power configuration of the organized social groups? Is one group or coalition of groups clearly dominant? Is the power distribution stable or shifting? . . .

Political ideology denotes the patterns of thought and belief that relate to the state and the government. The social function of political ideology is to legitimize the organized force of the state. Hence the presence of conflicting or hostile ideologies in a system is one of the best indices of instability. Since ideologies generate the motivations of power groups, a study of group ideology is of critical importance in forecasting how a group will behave in the future. . . .

Political institutions include both the formal organs of government and informal organs (political parties and other organized social groups) that can influence the deliberation and decision-making of government leaders.⁸²

The relationships among the four aspects of the political system, decision-making, power, political ideology, and political institutions, formulate Root's model for forecasting political/social risks. (See Figure 2.) They evaluate, albeit subjectively, the method by which social groups translate conflicts into government decisions and policies.⁸³

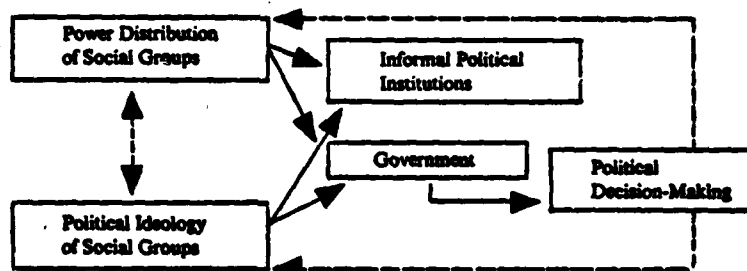
Although all the elements of this model are inter-dependent, changes in power distribution and ideology are the most common sources of political stability or instability. Shifts in

⁸²Ibid., pp. 362-363.

⁸³Ibid., p. 363.

power distribution (for example, the ascendancy of a political party or the military) that are not accompanied by radical shifts in ideology will provoke non-revolutionary changes in the system. Although employing physical force, most coup d'etats fall into this category. When, however, a major shift in power distribution is also accompanied by a radical shift in ideology (for example, the . . . coup d'etat in Libya), a revolutionary situation is created that may transform the political system itself with a new set of political institutions. Generally speaking, changes that cause a divergence between ideology (values) and the power distribution lead to conflict. If a government fails to bring about a "synchronization" between values and the power configuration through reform, propaganda, or negotiation and it does not have the power to repress conflict, then the government will lose authority (legitimacy) and eventually collapse, either by violent or non-violent means.⁸⁴

Figure 2 . A Political/Social Risk Forecasting Model



*Model from Franklin R. Root, "Analyzing Political Risks in International Business," in A. Kapoor, et al., ed., The Multinational Enterprise in Transition (Princeton, N.J.: The Darwin Press, Inc., 1972). One might argue that there should also be an arrow from Informal Political Institutions to Government but Root did not include one in his model.

⁸⁴ Ibid., p. 364.

According to Root, the political considerations in international markets result in an analysis of the why of change or stability. In international arms transfers, political considerations can be viewed from several perspectives. From the point of view of the technology acquiring nation several political considerations were noted. One decision was made to acquire a new system and another to manufacture it locally. A desire to acquire increased technical capacity became a decision. For smaller nations the economies of scale that are available from coproduction agreements and the increased national acceptance of locally produced products are positive incentives for the populace to maintain the current leadership. The creation of new jobs and/or the protection of a less efficient national industry also maintains the image and self-esteem of the government. From the perspective of the technology supplying nation coproduction may be the only alternative to no increased sales at all. But other positive incentives exist as well. Once a coproduction agreement is reached, the supplier nation can use local economic and political pressures in the acquiring nation to maintain the agreement and the industry. Coproduction encourages economic development to a limited extent, at least as far as the defense industry is concerned. And, finally, the transfer of technology

provides alternate operational and maintenance facilities to support projection of the supplier nation's foreign policy. For both acquiring and supplying nation the ability to add more control to balance of payments deficits is a positive consideration.

Other political considerations flow from the above decisions. Once the attractiveness of coproduction is established the supplier nation has to evaluate the particular proposal and determine how to start the enterprise. Addressing the latter consideration first, treaties, licenses and contracts establish the boundaries of what technology, goods and services are to be transferred. Treaties also promote closer ties by helping to establish bonds of familiarity and reducing uncertainty. Treaties, licenses and contracts, thereby reduce the coproduction proposal to concrete reality. The former consideration, evaluation of the particular proposal, is more complex. The Comptroller of the United States listed questions to which the State Department must seek answers. Root presented a model for evaluation of political/social risks, but called it crude. Both documents point to the importance of evaluating the stability of recipient nations. Both left the answers to their questions to subjective determination. In an effort to find clearly objective and definable factors of national

stability to use in evaluating the political considerations in offset proposals, a mini-study was prompted in political socialization to locate a suitable scale. No existing scale was found. A model for evaluation was aggregated from readings in the area. The efforts to locate a scale of stability are described in the following section.

Stability in Governments

Tapper tells us that "a central issue in the study of politics is to account for the stability of the political order."⁸⁵

The essential ingredient in this relationship is the support of the citizenry for the established order. Citizen support is not something that nation states can take for granted, so institutions have been established and processes instigated that have as their goal the building of support. These processes are invariably referred to as socialization and the institutions as the socializing agents. On the basis of this theory political stability is thus a consequence of socialization processes that are effective in creating citizen support.⁸⁶

Using this as a basis, then, the task becomes a method of identifying the socialization processes and utilizing a scale or model to judge them qualitatively or quantitatively to determine the degree of stability.

⁸⁵Ted Tapper, Political Education and Stability, Elite Responses to Political Conflict (London: John Wiley and Sons, Ltd., 1976), p. 1.

⁸⁶Ibid., p. 1.

Unfortunately, no standard list of processes and no standard scale or model for stability proved to be available. That resulted in a more extensive research into political socialization to devise such a scale or model. The actual development of the resultant model will be described in Chapter 3. The background of the literature search to enable that development is addressed here.

According to Tapper most models of a political system have a common structure that is described as a number of outputs and inputs wherein the outputs feed-back to modify the inputs. There are two input variables, demands and support.⁸⁷ He says of demands that,

It is much easier to control or stimulate demands than it is to build or destroy support. Demands, therefore, are more likely than support to be influenced by factors other than socialization.⁸⁸

Support is composed of both mass socialized support and elite recruitment and socialization.⁸⁹ Tapper says of elite recruitment and socialization:

When political scientists talk of elite recruitment and socialization they are invariably thinking in terms of political activists and more especially the institutionalized political elites.

⁸⁷ Ibid., p. 2.

⁸⁸ Ibid., p. 2.

⁸⁹ Ibid., p. 2.

The central premise is that to keep the political life of a society flourishing, and all that follows from that, there have to be individuals who are prepared to engage in political activities and to hold political office. . . . Empirical evidence shows that democratic values are more faithfully adhered to by political elites than by most other citizens. Activists can be viewed as the custodians of the society's values.⁹⁰

Tapper uses Easton and Dennis's definition of support to subdivide mass socialized support into two categories, specific and diffuse.⁹¹

Specific support is the individual's assessment of the rewards and disadvantages accruing to him from his belonging to the political system and more particularly it is his evaluation of the personal effects of governmental policies. Diffuse support is . . . the generalized trust and confidence that members invest in the various objects of the system as ends in themselves.⁹²

Aside from this definition of mass socialized support, Tapper also attributes consequences to support; the ability of the political system to maintain itself. He distinguishes between the qualities of maintenance and persistence.

Maintenance can be viewed as the perpetuation of a system in an unchanged form, while persistence represents a modification of that system over time.⁹³

In stronger tones Tapper refers to cleavages within a society in referring to the inability of a society to

⁹⁰Ibid., p. 2.

⁹¹Ibid., p. 3.

⁹²Ibid., p. 3.

⁹³Ibid., p. 8.

maintain or persist. He quotes Lijphart:

If a society is divided by sharp mutually reinforcing cleavages within each segment of the population living in its own separate world, the dangers of a breakdown of the system are clear--not only to the social scientist but to any reasonably intelligent observer, including the political decision-makers.⁹⁴

Looking further into methods of identifying socialization processes Milnor strongly implies that elections are stabilizers for any type of government.

He says the following:

Elections are more than just the occasional activation of a political institution. They appear to be social institutions, strange ones at that, because through the electoral system individuals in the political system respond to the whole--the electors respond to the decisions past, present, and potential of the government that is attempting to serve their interests.⁹⁵

However, the type of system that a government utilizes after the election, plurality or proportionality, is an attribute that can describe the system and, to some degree, its stability. Milnor says this:

. . . Plurality systems, characterized by single-member districts that reward local pluralities, penalize minorities severely, leaving them without a shred of representation unless they can muster sufficient strength to defeat any coalition against them, and thus contribute directly to alienation and estrangement from politics.

.

⁹⁴Ibid., p. 231.

⁹⁵Andrew J. Milnor, Elections and Political Stability (Boston: Little, Brown & Company, 1969), p. 100.

It seems obvious that dissident ideological movements that lack the ability and the will to combine with more pragmatic parties face a better future in proportional systems than they do in most plurality systems.⁹⁶

Milnor makes clear that he is using his statements as an explanation of causes of stability or instability and that there are other subtle influences that are not totally considered.⁹⁷

Milnor very strenuously supports the electoral process as a prime stabilizer because of the extent of citizen involvement. He presents several reasons which he lists as "two," but which produce attributes that affect this study. He says the following:

His involvement with the political system is at least twofold. First, he votes for parties and candidates most favorable to those causes to which he is attached. He is integrated into the political system insofar as his particular interests receive the attention of the majority supporting the government, or at least insofar as the majority does not threaten his interests. The voter is able to identify with the government precisely because he feels that his act of voting has meaning in terms of specific protection which he receives from the government. Secondly, the act of voting itself integrates the voter into the political system. By playing a part in the political system which he conceives of as meaningful and useful, he is in a very real sense affirming his own role in the system. The act of voting brings him as close as he may ever come to the actual decision process, and that may be a very important political fact for the electorate at large.⁹⁸

⁹⁶ Ibid., p. 101.

⁹⁷ Ibid., pp. 100-101.

⁹⁸ Ibid., p. 104.

Milnor's words show that it is not the electoral process that is important. Rather, it is the extent of citizen involvement that it elicits that contributes to stability.

Hughes, in looking at the electoral process, found both long and short term influences that contribute to stable or unstable behavior. The more important are the long term influences of political socialization.

As to the long-term dispositions, we know that individuals tend to vote as members of social groups; political attitudes are stabilized in terms of association with other members of the principal basic social groups in which the voter is involved. . . . It is as a structure of groups that society is most stable and integrated, and changes most slowly. The individual voter is socialized into his political attitudes, not, as Sir Ivor Jennings suggested, on casting his first vote, nor at the moment of birth, as Private Willis of the Guards believed in Iceland, but in his mid and late teens, one consequence is the remarkably high positive correlation between the voter's political allegiance and that of his parents. . . .⁹⁹

To Hughes, these long term influences are so strong that they tend to distort the perception of any transitory influences. Short term influences have a better chance of affecting stable behavior if they are substantial and easy to comprehend. He uses as examples, war, depressions, and other like occurrences.¹⁰⁰

⁹⁹Colin A. Hughes, Political Stability and Political Behavior (St. Luke's, Queensland, Australia: University of Queensland Press, 1968), pp. 23-24.

¹⁰⁰*Ibid.*, p. 24.

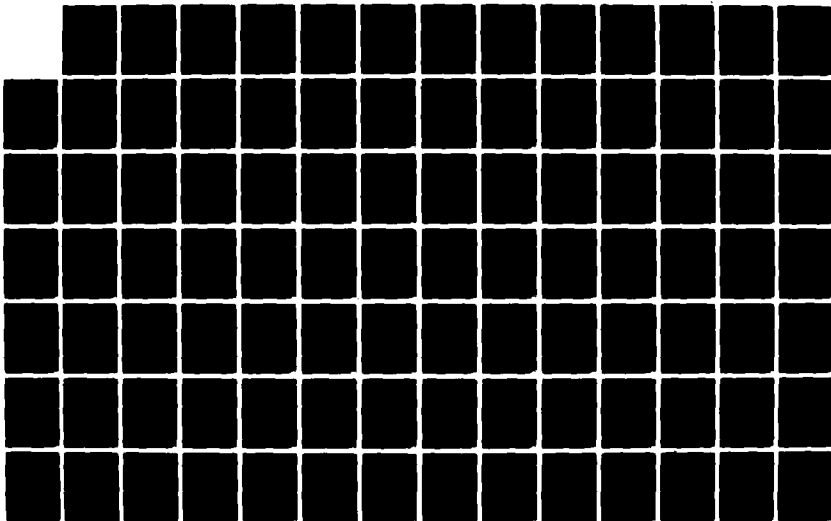
AD-A121 567

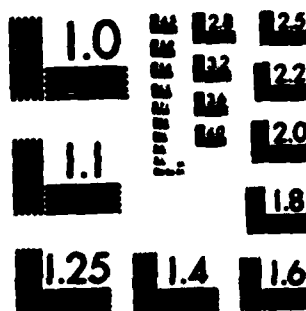
A MODEL FOR THE EVALUATION OF OFFSETS IN INTERNATIONAL
ARMS TRANSFERS(U) SAINT LOUIS UNIV MO H L BAILEY 1982

UNCLASSIFIED

F/G 15/5

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Mordlinger studied conflict regulation in deeply divided societies featuring open regimes. His concept of conflict regulation is expressed in a statement of Schattschneider: "The crucial problem in politics is the management of conflict. No regime could endure which did not cope with the problem. All politics, all leadership and all organization involve the management of conflict."¹⁰¹ The purpose for Mordlinger's study of conflict regulation is a search for factors underlying stability. He says the following:

In studying conflict regulation in deeply divided societies featuring democratic or, more broadly, open regimes, we are searching for the factors which account for the stability of such regimes under conditions of severe stress.¹⁰²

Mordlinger sought to be pragmatic and looked to past situations for examples of successful conflict regulation. He sought to answer the question, "What are the various conflict-regulating practices worked out by opposing conflict groups when they succeed in regulating their conflicts?"¹⁰³ His study surveyed common practices and developed a list of six conflict-

¹⁰¹Eric A. Mordlinger, Conflict Regulation in Divided Societies (Harvard University: Center for International Affairs, "Occasional Papers in International Affairs," No. 29, 1/72), p. 1.

¹⁰²*Ibid.*, p. 2.

¹⁰³*Ibid.*, p. 20

regulating practices. He had the following to say about those practices:

When intense conflicts are successfully regulated one, or more, of six conflict regulating practices is always employed. The six practices are the stable coalition, the proportionality principle, depoliticization, the mutual veto, compromise and concessions.¹⁰⁴

Grinter in his article, "Nation Building, Counterinsurgency and Military Intervention," examined stability and instability in the light of the American experience with the Rostow doctrine in Vietnam.¹⁰⁵ He contributed three factors, two listed and one implied, as important to stable or unstable conditions. Most important to him was citizen involvement. He said the following:

When a developing country is experiencing incipient insurgency, invariably the rebels emerge out-administering the government, not out-fighting it. Diem, the generals who followed him, and the United States all made the mistake of assuming that a large army and conventional military occupations could substitute for effective penetration and organization of the population. Unlimited injections of economic aid and military resources were seen as replacing indigenous sources of participation and support, administrative

¹⁰⁴ Ibid., p. 117. For a detailed explanation read all of chapter two.

¹⁰⁵ The Rostow doctrine assumed that the ultimate source of South Vietnam's problems lay in North Vietnam rather than in the political and administrative decay in the South. See Lawrence E. Grinter, "Nation Building, Counterinsurgency and Military Intervention," in Ellen P. Stein, ed., The Limits of Military Intervention (Beverly Hills, Cal.: Sage Publishing, Inc., 1977), pp. 248-249.

talent, and organisational skill.¹⁰⁶

Culture and social forces and salience of power were the other two factors important to Grinter. He stated his views straightforwardly:

Thus we have found that conventional bureaucratic-military responses to revolutionary warfare do not work. They do not take into account the relevance of culture, social forces, and, above all, politics. They perceive socio-economic problems through technological and administrative filters. They graft favored programs and resources onto foreign problems. They recreate reality in their own image, justifying progress by documenting effort. Conventional liberal democratic responses to revolutionary warfare do not work either. They underestimate the role of force and violence. They do not take into account the salience of power, the necessity of creating, centralising, and institutionalising power before it can be shared. They apply Western values to non-Western problems.¹⁰⁷

Pirages believes with Nordlinger that the control of conflict is the main function of politics. He says, "conflict is inherent in organized society and controlling it is a central function of political processes."¹⁰⁸ He proposes a number of factors that contribute to stability or the lack of it. Among them are appropriate outlets for competition;¹⁰⁹ rules and

¹⁰⁶ Ibid., p. 249.

¹⁰⁷ Ibid., p. 281.

¹⁰⁸ Dennis Pirages, Managing Political Conflict (New York: Praeger Publications, 1976), p. 3.

¹⁰⁹ Ibid., p. 3.

sanctions for behavior including tacit relief from rule observance if not found out; rising expectations brought about by resource and position scarcity, by economic and psychological needs, by race and ethnicity, by religion and ideology and by regionalism and nationalism; economic conditions that are tightly linked to inflation and unemployment rates; strong leadership; and conflict management.¹¹⁰ He also lists a number of traits of the ruled which help to maintain stability in a society. They include political apathy, the criterion of competence of others, the economy of the status quo, the appearance that decisions correspond to the values of the group, the threat of force being used, the tying of authority to religious beliefs, the acquiescence of grievances to moral suasion, the acceptance of managed socio-political information, the modification of individual beliefs¹¹¹ and the lack of perception of relative deprivation.¹¹²

¹¹⁰Ibid., pp. 6-17.

¹¹¹Ibid., pp. 28-40.

¹¹²Ibid., p. 7.

Liska gives the impression of being a politico-economic writer who bases his concepts of stability solely on economic grounds. An example of his writing that expresses that viewpoint follows:

On the plane where economics meets and contests with politics for primacy, the relative preeminence of economic 'kingdoms' in the contemporary third world lies, if anywhere, in two features: functionally, in that economics encompasses both the primordial generation of conflicts and their definitive integrative resolution in an era and arena particularly conscious of economic development; ethically, in the incapacity of less developed countries to employ economic means effectively to enact conflict, which is thereby relegated to politico-military instruments.¹¹³

Daniel Bell supports that same view. "It would be foolish, these days, to assert that economics determines politics; but the economic context is the necessary arena for political decisions to be effective."¹¹⁴

Nieburg explores the use of violence as an instrument of stability in both domestic and international processes. In the domestic sense he relates that:

¹¹³George Liska, States in Evolution: Changing Societies and Traditional Systems in World Politics. Studies in International Affairs Number 19. (Baltimore: The Johns Hopkins University Press, 1973), p. 102.

¹¹⁴Daniel Bell, "The Future World Disorder: The Structural Context of Crisis," in Fred A. Sodermann, et al., The Theory and Practice of International Relations, 5th ed. (Englewood Cliffs, N.J.: Prentice Hall and Co., 1979), p. 381.

Violence has two inextricable aspects: its actual use . . . , or its potential use. The actual demonstration of violence must occur from time to time in order to give credibility to its threatened outbreak, thereby gaining efficacy for the threat as an instrument of social and political change. The two aspects, demonstration and threat, cannot be separated. The two merge imperceptibly into each other. . . .

The 'rational' goal of the threat of violence is an accommodation of interests, not the provocation of actual violence.¹¹⁵

In the international sense, he says:

In international politics, the threat of violence tends to create stability and maintain peace. Here the threat is more directly responsive to policy controls. The nation-state has greater continuity than the informal political systems that coalesce and dissolve in the course of domestic social change.

Because of the greater continuity of these macro-systems, the national leaders must strive to maintain the prestige of a nation's might and will. If the reputation of a nation's military power is allowed to tarnish, future bargaining power will be weakened.¹¹⁶

Rosen utilizes military, economic and socio-political factors to establish a basis for stability. Among his military factors are use of external hostilities to increase unity, a strong sense of "national" self-image and the accompanying lack of irredentism.¹¹⁷

¹¹⁵ Harold L. Nieburg, "Uses of Violence," in Fred A. Sondermann, et al., ed., op. cit., p. 185.

¹¹⁶ Ibid., p. 187.

¹¹⁷ Steven J. Rosen, et al., The Logic of International Relations, 2d ed. (Cambridge, Massachusetts: Winthrop Publishers, Inc., 1977), p. 133.

Other factors are the economic potential of the nation for full employment, the political potential to affect outside nations, social assimilation of minority cultures, value sharing and expectation of mutual benefits.¹¹⁸

Stonier traces the macrohistory of human development and establishes three factors as basic to political and military stability. The basis for Stonier is a question of the economic capacity of a particular geographic area. Upon this is built the social climate that determines stability or instability. Any change in sufficiency or utilization of resources can then affect changes in the basic structure of the society and cause instability.¹¹⁹

In summary, the authors encountered during the literature search have mentioned various factors affecting stability or instability. Unfortunately no quantitative or qualitative model was located that could assist in evaluating the stability of a government for the purposes of determining the likelihood of implementation in a specific offset proposal. In chapter

¹¹⁸ Ibid., pp. 383-387.

¹¹⁹ Tom Stonier, "Economic and Technological Prerequisites for Achieving Political and Military Stability," in David Carlton and Carla Scherf, ed., Arms Control and Technological Innovation (New York: John Wiley and Sons, Halsted Press, 1976), pp. 342-357.

three, the development of the model that was used will be described. Before proceeding to the model, however, there are other concerns in the evolution of offsets that must be addressed. We turn next to the National Security aspects.

National Security Concerns

The national security concerns impelling nations to seek to enter offset agreements for codevelopment and coproduction are closely intertwined with economic factors and political considerations. Because national security concerns require alertness to possible compromises of strategy, tactics and technological advantages,¹²⁰ the researchers who studied this question have been able to develop arguments both pro and con for the employment of offset agreements. Some of the benefits have been incorporated into Department of Defense policy on participation in codevelopment or coproduction projects. The Comptroller General quotes DOD policy:

The principal goals contained in DOD Directive 3100.3 are as follows:

1. To make the best equipment available to the United States and its allies as quickly as possible.
2. To increase the effectiveness of the scientific and technical resources of the United States

¹²⁰James T. Coleman, et al., "On Some Aspects of Foreign Military Sales" (unpublished research report, Air Command and Staff College, Air University, 1975), pp. 32-34.

and its allies, especially by eliminating unnecessary and wasteful duplicated effort.

3. To standardise equipment as much as possible.
4. To create closer military ties among the allies.

The policies restrict cooperation to those programs which satisfy a military need and provide the United States with design and production rights equivalent to those secured from domestic sources. Moreover, preference is to be given to programs not adversely affecting the U.S. balance of payments.¹²¹

Banas and Reid support the concept of standardization as a national security advantage of offset agreements as does McLaren. Banas and Reid say that "standardization facilitates communication between U.S. and allied forces, use of the same or similar tactics, and increases the capability of allied and U.S. forces to conduct joint operations."¹²² McLaren, in speaking of the NATO alliance, says the following:

We want to achieve standardization of military equipment within NATO wherever compatible with operations and logistics. Where standardization cannot be achieved, we want compatibility in

¹²¹U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries. (R. M. Keller) (Report to the Congress, Washington, D.C., 1973), pp. 3-6.

¹²²John M. Banas, and James R. Reid, "A Case History of the Coproduction of the F-5E Aircraft by the United States of America and the Republic of China," (Master's thesis. Air Force Institute of Technology, 1973), p. 101.

operations and interchangeability of high-density components and high-volume consumables in logistics.¹²³

Coleman refers to some standardization in referring to a benefit that he calls "war-readiness." However, he considers the reduction in the balance of payments problem and the increase in technical improvements as more important. In speaking of "war-readiness" he says:

By the very nature of co-production, the Allied countries would possess a stock of common spares. A pool of skilled workers is always available for repair and overhaul of co-produced systems. This should greatly ease the logistics problems when the U.S. is called upon to assist in fighting a war in or near the Allied countries. Although not likely, the assembly lines could also help the U.S. by providing 'surge' production capacity.¹²⁴

The concepts of codevelopment and coproduction are not without their perceived limitations. The Comptroller General lists several:

Initiating and participating in an international cooperative research and development program is not easy because of various formidable obstacles. Pooling economic and technical resources, opens the way for the Nation's balance of payments to be adversely affected or its employment base eroded. Moreover, differences among nations' requirements, policies, standards, national security, capabilities, and attitudes are wide and generally irreconcilable. These

¹²³William D. McLaren, United States Defense Industry Guide for Conducting Business with NATO Organizations and Other Countries (Washington, D.C.: Dept. of Documents, U.S. Government Printing Office, 1971), p. 15.

¹²⁴James T. Coleman, et al., op. cit., pp. 130-140.

obstacles not only prevent programs from starting but they also influence the nature and outcome of programs which do start.¹²⁵

Coleman and his fellow researchers relate four other disadvantages of coproduction. They include the drain on U.S. armed forces personnel who have to shoulder the administrative burdens of the program in addition to normal duties, the proliferation of arms among lesser-developed and developing nations, the transfer of technology and the decreased cash inflow from straight sales, although they acknowledged the weakness of their last point due to the possibility of no sales.¹²⁶

Hantke gives us a checklist that is used in the Department of State in evaluating national security impacts in arms transfers. The questions which are asked are as follows:

The threat the military capability is supposed to counter or deter, whether the United States agrees on the nature of the threat, and how it relates to U.S. security

How the proposed arms trade affects the regional military balance, regional military tensions, or the military buildup plans of another country.

Whether the recipient country has the capability to absorb and utilize the arms effectively.

What other military interests--for example, overflight rights, access to facilities, or base rights--would be supported by the transaction.

¹²⁵U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries, op. cit., p. 18.

¹²⁶James T. Coleman, et al., op. cit., pp. 141-143.

The impact on U.S. readiness. . . .

Whether a substantial physical dependence on U.S. sources of supply could enable the United States to better control conflict under certain circumstances.

Finally, except in special circumstances, the United States does not sell or otherwise transfer certain sensitive items such as hand-transportable surface-to-air missiles and weapons which are primarily designed for use against crowds.¹²⁷

The basic issue is to make the best possible systematic judgment in light of the totality of U.S. interests just as is done in other international political judgments. And this is a critical point: security relationships are an element of foreign policy and thus neither more or less subject to uncertainties than any other tool of policy.¹²⁸

The national security factors have been shown to be closely intertwined with the political considerations which were examined in some detail. We have also said that they were intertwined with the economic factors. That aspect of offsets in international arms transfers will be examined next.

Economic Factors

The importance of economic factors in the international arms transfer market pre-dates the development of offsets. In his research in 1952 into foreign aid as a technique for achieving national objectives, Behrman said the following:

¹²⁷William S. Bankes, "The Role of Arms Trade in a Changing World Environment" (unpublished research memorandum, Strategic Studies Institute, Army War College, 1976), pp. 8-9.

¹²⁸Ibid., p. 9.

If regional cooperation is not tied in some fashion to assistance from the United States, it is difficult to see what is gained by regional approaches to economic cooperation with the United States although there may be strong political, strategic and some economic reasons why it may be advantageous to the countries of a region to associate even in a loose political or economic organization.¹²⁹

He also recognized the compounding of factors that may arise due to interaction. Behrman acknowledged that ". . . pressure to gain a military or security advantage leads into measures contrary to long-run United States international economic goals."¹³⁰

Dolins researched the economic factor in international joint ventures experienced by NATO and OECD. He traced the distrust and lack of willingness to share in early proposals for joint ventures and the attempt that countries made to manipulate share costs formulas to prevent any one nation from cooking its goose over the common fire.¹³¹ He too recognized the factor interaction with the following comment:

¹²⁹ Jack W. Behrman, "Foreign Aid as a Technique in Attaining United States International Economic Objectives," (Doctoral dissertation, Princeton University, 1952), p. 52.

¹³⁰ Ibid., p. 86.

¹³¹ Stanley L. Dolins, "The Economic Allocation of Share-Costs in Joint International Ventures: An Examination of the NATO and OECD-DAC Experience" (Doctoral dissertation, University of Colorado, 1965), pp. 31-32.

In military science, the political military and economic problems are often only different facets of the same problem. If the objectives of military action are distinguished as the political problem, the choice of means for achieving these objectives becomes the military problem, while the financing of these military means may be considered the economic problem.

Experience reveals that such problems are solved in a nearly simultaneous fashion. Initially, however, the economic aspects of the problem may be referred to by considering first, how much each nation can afford and second, what is each nation's appropriate share of the total military costs of the alliance.¹³²

Because of his early research into international joint ventures, Dolins did not find a great deal of evidence to support an optimistic future for cooperation on a multi-national level. His research left him with definitely negative feelings about their use in the future. He said the following:

In conclusion, a military alliance that seeks significant economies and a sharing of joint effort through specialization in military labor and material is difficult to effect. The theoretical economies are almost never realized because the issues hinge on factors other than the joint interest. The degree of specialization that results is largely a function of the commitment the member nations made to the common purpose.¹³³

Other researchers were more positive in their views of the economic factors supporting codevelopment and coproduction. Vandevanter in his study of

¹³²Ibid., p. 68.

¹³³Ibid., pp. 94-95.

collaboration in weapons production said the following:

The biggest advantage of coordinated production that its proponents cite is the reduction in the cost of weapons. As nations combine to buy large quantities of a single item, they profit from the economies of scale. Their sharing the burden of research, development, engineering, and testing will also help lower the cost of the end product. Then, too, it has been pointed out that the smaller nations, whose industries could not produce entire weapon systems, and who might be squeezed out in unrestricted competition among the big manufacturers, could participate in NATO-wide programs as subcontractors.¹³⁴

Hall and Johnson in their study of specific cases of aircraft production and procurement strategies paid particular attention to the Japanese coproduction of the American designed F-104J aircraft. They found coproduction to produce very favorable economic impacts for the technology exporting nation.

If we look for a moment solely at the impact of co-production on the U.S. balance of payments, the advantages may not be as large as often supposed. For the F-104J program, for example, in addition to the \$75 million the United States contributed to the program--all of which was spent in the United States--we estimate that about \$88.7 million of the Japanese contribution was also spent in the United States. . . . In other words, the F-104J program yielded a net addition to U.S. exports, and therefore in our favor in the balance of trade, of nearly \$90 million.¹³⁵

¹³⁴ Elliott Vandevanter, Jr., International Logistics: Interallied Collaboration in Weapons Production (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 5.

¹³⁵ G. R. Hall and R. E. Johnson, "Aircraft Co-Production and Procurement Strategy" (unpublished research report, Santa Monica, California: Rand Corporation, 1967), p. 184.

In addition to the balance of payments advantages that may accrue, Hall and Johnson mention several other important benefits of coproduction. They include sharing the financial burden, political and economic acceptability of a foreign designed or partially designed system, and elimination of dependence on sole source suppliers and the consequent monopoly pricing practices.¹³⁶ Coleman is also a strong supporter of coproduction for economic reasons in addition to balance of payment considerations. The designing country, in instances where codevelopment is not undertaken, enjoys the introduction of technological improvements paid for by the other nations. Where codevelopment is undertaken, new technology is still obtained at a reduced cost. The increased pool of skilled workers that results also decreases costs associated with the logistics system.¹³⁷

Catledge and Knudsen approach the economic factors of coproduction from a slightly different perspective. They ask the question of what are the penalties associated with not agreeing to codevelopment and coproduction proposals from other nations, particularly the emerging ones.

¹³⁶ Ibid., pp. 188-189.

¹³⁷ James T. Coleman, et al., "On Some Aspects of Foreign Military Sales" (Research report, Air Command and Staff College, Air University, 1975), pp. 139-140.

Even though a country might presently lack the capability of entering into production of a major system, failure of the United States to recognize these rising industrial and technological ambitions may lead the country to seek military assistance from sources unfriendly to the United States. Should this occur, the United States would not only be losing a customer but may likely be losing an ally.¹³⁸

The research of Banas and Reid supports this approach and viewpoint.¹³⁹ However, they also found some disincentives to coproduction, economic and otherwise, that were seldom mentioned elsewhere. Among these disincentives were the attitudes of labor and labor unions, the ability of the developing nations to support the costs and technological demands of coproduction, and finally the thought of helping to generate a potential competitor for future markets.¹⁴⁰ The Comptroller raised a practical problem that has since diminished although it is still with us; the problem of differences in national standards.

¹³⁸ Morris B. Catledge and Lorrie F. Knudsen, "Foreign Military Sales: United States Involvement in Coproduction and Trends Toward Codevelopment." (Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1969), pp. 16-17.

¹³⁹ John M. Banas and James R. Reid, "A Case History of the Coproduction of the F-5E Aircraft by the United States of America and the Republic of China." (Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1975), pp. 1, 7.

¹⁴⁰ Ibid., pp. 104-105.

The United States uses the English system of weights and measures, whereas our allies and most other countries in the world use the metric system. Moreover, there are differences in national standards for materials such as sheet metal, plate, wire, and electronic components. Likewise, standards for engineering drawings differ. These differences can pose intricate problems for international cooperative development programs.¹⁴¹

Despite whatever problems may be posed by those differences in national standards, or the other economic disincentives posed by the researchers, codevelopment and coproduction programs are a fact of life. Whether or not they will remain with us is, of course, a matter of speculation. But if the adoption of checklists by the highest levels of the Department of State is any bellweather, then they will be with us for some time to come. Hanks reports on such a checklist, albeit brief, that asks several pertinent questions. Is the proposed agreement consistent with the country's development goals, or the U.S. economic assistance program? Will the agreement strain the country's ability to manage its debt obligation or entail operations and maintenance costs that might make excessive claims on future budgets? Are there overall economic benefits to the

¹⁴¹U.S., Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries [by R. M. Keller], Report to the Congress (Washington, D.C., 1973), p. 23.

United States from the coproduction of arms?¹⁴²

The economic factors in the Department of State checklist and those found throughout the literature search were closely intertwined with political considerations. It was often difficult to separate them in the reading and as Dolins noted they were often different aspects of the same problem.¹⁴³ We will turn next to an aspect of codevelopment and coproduction that was only briefly discussed: the legal.

Legal Aspects of Codevelopment and Coproduction

Given the American penchant for consulting lawyers and involving them in the drawing of contracts, a basic assumption was that a rich history of the legal aspects of codevelopment and coproduction was available. To be sure a legal foundation for the conduct of these activities had been painstakingly established in legislation: the Mutual Defense Assistance Act of 1949, the Mutual Security Acts of 1951 and 1954, the Foreign Assistance Act of 1961, the Foreign Military Sales Act of 1968, the Rio Pact of 1947, the North Atlantic Treaty of 1947, the ANZUS Treaty of 1951 and the Southeast Asia Treaty of

¹⁴²William B. Hanke, op. cit., p. 8.

¹⁴³Stanley L. Dolins, op. cit., p. 68.

1954.¹⁴⁴ But a treatise on the legal concerns of enterprises involved in codevelopment and coproduction was not found. Descriptions of problems that arose because of insufficient preplanning and management actions to overcome them were available. An excellent example of documentation prepared to establish an initial body of literature for problems and precedents is contained in the Chrysler Corporation report on the HET-70 heavy equipment transporter.¹⁴⁵ The problem of patent rights, third country sales, et cetera was recognized, but if a comprehensive body of knowledge had been compiled on the problems to look for and how they were overcome in the past, this researcher was not successful in locating it. Howard, in examining technology transfers wrote of channels for transfer and the activities addressed in each channel.

The first channel is government-to-government via international bodies such as the United Nations, NATO, or the World Bank. Their activities include

¹⁴⁴For a discussion of the formal treaties and agreements, see the following: Crawford O. Murphy, "An Analysis of Foreign Military Sales and Cooperative Logistics Support Arrangements." (Research report: Air War College, 1975), pp. 7-10 and Alexander H. Cornell, "An Analysis of International Collaboration in the Organization and Management of Weapons Coproduction." (Doctoral dissertation, American University, 1969), pp. 73-95.

¹⁴⁵B. D. Jones and K.L. Kuns, ed., "US/FRG Heavy Equipment Transporter Program, HET-70: Final Report, HET-70 Planning." (Chrysler Corporation report, Detroit, Michigan, 1966), 127 pages.

economic and, technical assistance programs, cooperation in science and education. The business channel includes international corporations or domestic corporations with international interests. . . . Most of the complicated technologies are transferred via the business channels. The two most frequently used mechanisms of transfer are direct investment and licensing agreements. The third channel of transfer is the people-to-people channel.¹⁴⁶

The categorization of technology transfer into channels recognizes that the transfer of information with proprietary interest may involve legal concerns. The statement that most of the complicated technologies go through business channels and are implemented through direct investment or license agreements further reinforces that perception. But Howard does not pursue what is a peripheral point in his research.

McLaren looked at legal rights of American business firms dealing with NATO and its subsidiary bodies and at the protections extended to their privately owned patents and proprietary information. NATO and its subsidiaries are immune from every form of legal process, but the United States has bilateral or multilateral agreements with the various NATO member countries that permit protection of patents

¹⁴⁶Joe A. Howard, "Transfer of Technology Between Developed Nations: An Analysis of USAF International Cooperative R and D." (Doctoral dissertation, The George Washington University, 1974), pp. 25-26.

and proprietary information and fair treatment for owners.¹⁴⁷

Berry and Petersen examined the coproduction agreement for the RF-4 and drew some conclusions on that agreement that were readily applicable to other efforts.

. . . The "lesson learned" from the coproduction agreement with Germany was the critical importance of specific and candid guidelines for implementation of coproduction efforts. The coproduction agreements and procedures of the future must be written more like a business contract and less like a political arrangement. Logically, if the objectives of a coproduction agreement are expressed in quantitative terms of dollars and cents, then it follows that guidelines used to reach the objectives cannot be expressed in subjective terminology, such as "best efforts."

In future coproduction projects, specific procedures and decision criteria should be developed before firm contracts are executed. These procedures and criteria should appear in the country-to-country agreement whenever possible, and if that proves impossible or inappropriate, the detailed bilateral implementation plan should be developed separately and mutually agreed upon before entering the binding coproduction contracts.¹⁴⁸

¹⁴⁷William D. McLaren, United States Defense Industry Guide for Conducting Business With NATO Organizations and Member Countries (Washington, D.C., Superintendent of Documents, U.S. Government Printing Office, 1971), pp. 35-36.

¹⁴⁸Arnold M. Berry and Edward A. Petersen, "RF-4 Coproduction: United States and Federal Republic of Germany." (Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, Air University, 1975), p. 100.

From early FMS efforts involving joint ventures and technology transfer, through individual case studies of developed Memoranda of Understanding (MOU), the literature researched shows a need for more study and explanation of the legal aspects of codevelopment and coproduction. This apparent deficiency in identification of the legal aspects of offsets highlighted the need to examine the role responsibilities of agencies responsible for national political objectives.

Responsibility for National Objectives

Role of the Department of State

"The paramount authority and responsibility of the Secretary of State in matters of foreign policy is explicitly recognized in the Foreign Assistance Act of 1961."¹⁴⁹ Section 622(c) of that act states:

Under the direction of the President, the Secretary of State shall be responsible for the continuous supervision and general direction of the assistance programs authorized by this Act, including but not limited to determining whether there shall be a military assistance program for a country and the value thereof, to the end that such programs are effectively integrated both at home and abroad and the foreign policy of the United States is best served thereby.¹⁵⁰

¹⁴⁹ Leroy J. Haugh, International Logistics: Foreign Military Sales (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 26.

¹⁵⁰ Alexander H. Cornell, "An Analysis of International Collaboration in the Organization and Management of Weapons Coproduction" (Doctoral dissertation,

Within the State Department several organizations have important roles in overseeing military assistance and sales. Among them are the Agency for International Development and the various country policy desks.¹⁵¹ A political, military board under the Under Secretary of State for Security Assistance meets regularly to discuss the sale of weapons overseas. Each proposed sale is considered for its diplomatic implications.¹⁵²

Other important responsibilities carried out by the State Department are to provide executive guidance for conduct of approved military assistance/sales programs, determine the developed/less developed countries' categories, and to provide high level interface with foreign countries directly or through the in-country diplomatic mission.¹⁵³

In addition to this high-level coordination, the State Department, through its Office of Munitions Control, is involved in the day-to-day operations of military sales. This Office issues licenses to U.S. firms who want to export "munitions list" items or technical assistance related thereto.

American University, 1969), pp. 101-2. Contains excerpts from Public Law 87-195, 87th Congress, Foreign Assistance Act of 1961.

¹⁵¹ Ibid., p. 102.

¹⁵² Leroy J. Naugh, op. cit., p. 26 and William B. Hanks, op. cit., p. 7.

¹⁵³ John R. Young, "Program Management for Foreign Military Sales" (Research report, Defense Systems Management School, Ft. Belvoir, Virginia, 1975), p. II-6.

Munitions list items are broadly defined as arms, ammunition and implements of war, and include firearms, artillery, bombs, missiles, mines, propellants, naval war vessels, tanks, ordnance vehicles, military aircraft, fire control equipment, toxicological agents, and technical data related to these items.¹⁵⁴

Role of the Department of Defense

In the decision making process for determining the efficacy of military assistance or sales the viewpoints of Department of Defense officials are taken fully into account. However, it must be emphasized that the Defense Department does not make policy with respect to the arms trade. Its prime responsibility is to implement the policy determined at State.¹⁵⁵

The Secretary of Defense has certain responsibilities charged to him by the Foreign Assistance Act of 1961. These include:

Determination of military end-item requirements;

Procurement of military equipment in a manner which permits its integration with service programs;

Supervision of end-item use by recipient countries;

Supervision of the training of foreign military personnel;

Movement and delivery of military end-items;

¹⁵⁴Leroy J. Naugh, op. cit., p. 26.

¹⁵⁵William B. Hanks, op. cit., pp. 7-8.

Establishment of priorities in procurement, delivery, and allocation of military equipment; and

Any other functions within the Department of Defense with respect to the furnishing of military assistance.¹⁵⁶

Most of these responsibilities have been delegated to various elements within DOD by the Secretary.

The Joint Chiefs of Staff (JCS). The JCS recommend military objectives, force objectives, scale of equipment and priorities. They review programs to ensure that they stay in consonance with global security plans and make recommendations to the Secretary on all military assistance/sales guidance, plans and programs.¹⁵⁷

The Assistant Secretary of Defense, International Security Affairs (ASD/ISA). ASD/ISA exercises the authority of the Secretary of Defense in all military assistance and sales matters subject to the direction, review and control of the Secretary. ASD/ISA is charged with responsibility for the development, coordination, establishment of procedures, and direction of the Military Assistance Program, Grant Aid, Foreign Military Sales, Production and Military Assistance Advisory Groups.¹⁵⁸ Implementation of agreements, once signed,

¹⁵⁶Alexander H. Cornell, op. cit., p. 103.

¹⁵⁷Ibid., pp. 103-4.

¹⁵⁸Ibid., pp. 104-5.

development of specific procedures and actual negotiations are carried out by the subordinate but separate Defense Security Assistance Agency (DSAA).¹⁵⁹

The Military Departments. The major responsibility for preparing the data necessary for codevelopment or coproduction programs and their related budget estimates is borne by the military departments. They also provide advice and recommendations for changes to ASD/ISA as regards costs, availability, sources of supply, delivery forecasts and funding requirements. They do the actual procurement and delivery of weapons systems, components, materials and services in accordance with the established delivery schedules. They also supply the Military Assistance Advisory Groups with the technical advice pertaining to the weapon system, tactics and doctrine.¹⁶⁰

The Military Assistance Advisory Group (MAAG). The MAAG is the first level of contact that coordinates requests for assistance directly with members of the military departments of foreign governments. There is one assigned to each country with which the United States maintains diplomatic relations. The MAAG is staffed with members of the military departments who

¹⁵⁹Arnold M. Berry, et al., op. cit., p. 9.

¹⁶⁰Alexander H. Cornell, op. cit., pp. 105-7.

work directly with their service's directorate responsible for military assistance and sales. The MAAG is responsible for on-scene evaluations and coordination. The MAAG is an integral part of the U.S. diplomatic mission and, thus, reports, also, through Department of State communication channels.¹⁶¹

Role of Other Executive Agencies

While the Defense and State Departments have major concern with foreign military sales, the interests and roles of several other executive agencies should not be overlooked. The Commerce Department has cognizance over non-military U.S. international trade. It supports the Defense Department by providing foreign industrial information and basic marketing data, and by publicizing NATO business to U.S. industry.

The Treasury Department has the major responsibility for formulating and executing policies and programs dealing with international finances and currencies. Credit arrangements are frequently worked out between Treasury, Defense and the Export-Import Bank when a foreign government desires credit in connection with the purchase of U.S. military equipment.

Other agencies may become involved to a somewhat lesser degree. The Department of Agriculture and its Commodity Credit Corporation come into the picture when barter of agricultural commodities is part of the paying arrangements. The [Department of Energy] regulates and controls the dissemination and export of nuclear energy technology, products and materials; the National Aeronautics and Space Administration (NASA) is interested if the national space program or its hardware and technology become involved. The [Department of Transportation] monitors aviation and air traffic control plans. In addition, the Central Intelligence Agency may, at times, provide additional information necessary to evaluate a particular projected sale.¹⁶²

¹⁶¹John R. Young, op. cit., p. II-9.

¹⁶²Leroy J. Haugh, op. cit., p. 27. Substitutions have been made in the quotation for changed names

Effect of Membership in International Organizations

In considering the responsibilities for national objectives of the State and Defense Departments, it would seem that membership in an international organization would complicate those responsibilities. In reality, with regard to military assistance and sales, membership in treaty organizations has had a relatively small impact due to their lack of authority and the requirement for consensual agreement of the national governments. In the Foreword of his Guide for Conducting Business With NATO Organizations and Member Countries, McLaren says the following:

It should be emphasized initially that, in general, neither the NATO International Staff nor Supreme Headquarters Allied Powers Europe purchases production items outright. Such purchases are made through the procurement agencies of the individual nation. However, personnel of the International Staff and SHAPE do have an interest in keeping themselves informed of new defense items, weapons and communications systems.¹⁶³

The impact of NATO and other international organizations has been confined to their ability to engender trust through the close day-to-day working relationship that

of agencies. Department of Energy has absorbed the responsibilities of the prior Atomic Energy Commission and Department of Transportation absorbed the Federal Aviation Administration.

¹⁶³William D. McLaren, United States Defense Industry Guide for Conducting Business With NATO Organizations and Member Countries (Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1971), p. ii.

has allowed the discussion of international cooperative projects.¹⁶⁴

Problems Experienced in the Past

As would be anticipated in any endeavor involving complex agreements between or among nations and companies, some problems have been identified in the past. In 1976 the Comptroller General developed a list of growing concerns in the international arms transfer arena. They included lack of coherent policy by decision makers, the complexity of contracts written by diplomats rather than business persons, the increasing tendency for nations to try to impose controls in international arms sales, balance of payments deficits, declining national employment, upsetting of regional balances, the economic impacts of technology transfers on home industries, impacts on the readiness of U.S. forces, follow-on support agreements, and recovery by the U.S. Government of costs of sales.¹⁶⁵ Two years earlier, differences in national standards

¹⁶⁴See McLaren, op. cit., pp. 28-32 and Elliot Vandevanter, Jr., International Logistics: Interallied Collaboration in Weapons Production (Washington, D.C.: Industrial College of the Armed Forces, 1967), pp. 31-35.

¹⁶⁵U.S. Comptroller General, Foreign Military Sales--A Growing Concern [Reuben P. Atasta] (Report to the Congress, Washington, D.C., 1976), pp. 12-31.

had also been considered a major problem.¹⁶⁶ The absence of that subject from the list in 1976 indicated the improvement that had been made in that area.

In between those two reports, Banas and Reid in their research on the Republic of China F-5E coproduction effort identified the impact of inflation, uncertainty of production equipment quantity requirements, material shortages and untimely contract awards for government furnished equipment or aeronautical equipment, controls on delivery of goods to the customer by their selected vendor and coordination and communication.¹⁶⁷

Other Related Areas for Research

Two very major areas of concern for researchers that warrant extensive study are closely associated with this research. They are cooperative international logistics and technology transfer. Cooperative international logistics is a natural follow-on to any form of arms transfer. For the interested reader Ray¹⁶⁸

¹⁶⁶U.S. Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs with Allied Countries [R.M. Keller] (Report to the Congress, Washington, D.C., 1974), pp. 23-24.

¹⁶⁷John M. Banas, et al., op. cit., pp. 83-84.

¹⁶⁸William D. Ray, "Nonstandard Systems Support for Foreign Military Sales: Concept and Application" (Project report, Defense Systems Management College, Ft. Belvoir, Virginia, 1976), pp. 8, 13.

discusses the objectives of cooperative international logistics and the criteria for setting up appropriate programs. Cornell¹⁶⁹ addresses the management concerns in these programs. Technology transfer is looked at and evaluated in a number of ways by researchers. Approaches vary from the willingness of the firm to participate (Hall and Johnson),¹⁷⁰ through cost of resources (Teece),¹⁷¹ to developing trends (Fasick).¹⁷² The factors affecting technology transfer, both human and equipment, are addressed by Howard, McLaren and Oh.¹⁷³

¹⁶⁹Alexander H. Cornell, op. cit., p. 133.

¹⁷⁰G. R. Hall and R. E. Johnson, "Aircraft Coproduction and Procurement Strategy" (Research report, Santa Monica, California, Rand Corporation, 1967), pp. 48-49, 50.

¹⁷¹David J. Teece, "The Multinational Corporation and the Resource Cost of International Technology Transfer" (Doctoral dissertation, University of Pennsylvania, 1975), pp. 116-118, 178-179.

¹⁷²J. Kenneth Fasick, "International Sales: Perspectives on Technology Transfers and Contractual Obligations," in University of Virginia Conference on Procurement and Grants Management: Proceedings of the 1976 International Conference on Procurement and Grants Management Held at The Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976 (Univ. of Virginia, 1976), p. 40.

¹⁷³Joe A. Howard, "Transfer of Technology Between Developed Nations: An Analysis of International R and D" (Doctoral dissertation, The George Washington University, 1974), pp. 24-27; William D. McLaren, op. cit., p. 17; Moonson Oh, "The Role of International Corporations in the Transfer of Technology to Developing Countries" (Doctoral dissertation, University of Pennsylvania, 1970), p. 15.

Summary

In this chapter we have attempted to develop the evolution of offsets in the United States. Starting with George Stern Quick's research on the Industry Integration Committee of the Army Ordnance Department in World War II and those first efforts of U.S. industry to share patents, technology and management efforts, the thread has been woven through grant aid and foreign military sales to the quest today for codevelopment and coproduction by both developed and lesser developed countries. The impact of legislation and the changes in policy that have accompanied this evolution were also traced with respect to political considerations, including determination of stability, national security concerns, economic factors and legal aspects. The responsibility for national objectives was examined with respect to the roles of the Departments of State and Defense and of other government agencies. The impact of membership in international organizations was also addressed. In concluding, past problems that arose in the development of offset proposals were examined and other related areas for research were very lightly touched.

Chapter Three

DESIGN OF THE INVESTIGATION

Due to the relative newness of the field of cooperative research and development (codevelopment), and coordinated production (coproduction), the initial design of this investigation involved library research into a number of related areas. This was necessary to find the leads that were needed to develop an appropriate perspective of a newly developed field for research. The literature review included foreign military sales, international logistics, technology transfer, arms transfers and to a more limited extent the economic issues of balance of payments, production/share costing and the political issues of stability and types of treaties. Each article was reviewed with a particular bias toward how it could have contributed to a preference for an offset proposal and its concerns with political, cultural and legal considerations. The developmental pattern that emerged was described in Chapter Two.

After the development had been ferreted from the literature, a closer look was taken to identify factors that might have a strong relationship with the implementation or non-implementation of an offset

proposal. How those factors were identified and developed as variables for this research will be the primary subject of this chapter. Also contained in this chapter are a description of the research method used to obtain the necessary data, development of the appropriate research procedure, and selection of the research technique, discriminant analysis. The chapter will then describe the data used in the research and the hypothesis that was postulated as the basis for this research. The final part of the chapter will be devoted to a description of the data systems used in this study.

Research Method/Procedure

Review of the literature between 1960 and 31 December 1978 initially yielded fifty (50) cases of attempts to establish programs of international co-development or coproduction (see Table I) in which the U.S. Department of Defense was involved. Some of these programs were implemented and some were not implemented and ended in dissatisfaction to the negotiating parties. Additional research expanded the time period forward to 1952 and increased the number of cases to 124 with 191 country agreements. A table of all cases used in the research is displayed in Chapter Four.

During the review of the literature, it was found that 36 factors were mentioned by the researchers as being important to the implementation or non-

TABLE I

LIST OF CODEVELOPMENT AND COPRODUCTION PROJECTS
BETWEEN 1960 and 31 DECEMBER 1978
WITH U.S. DOD INVOLVEMENT

<u>Project</u>	<u>Countries</u>
F-16 Jun. 10, 1975 MOU	Belgium, Denmark, Netherlands, Norway
APC (M-113)	Italy
109MM Self Propelled Howitzer	Netherlands, Italy, Norway
RF-4	FRG
CH-53	FRG
F-5	Netherlands, Spain, Canada
Hawk	Japan
Nike Hercules	Japan
F-4	Japan
M-14 Rifle	Taiwan
F-5	Taiwan
M-16 Rifle	Korea
M-16 Rifle	Philippines
General Offset	
Agreement - 24 Sep. 75	U.K.
F-5E/F - Jul. 75	Swiss
Roland - Fall 75	France, FRG
F-111	U.K.
F-104G	FRG
F-104J	Japan
Skybolt	U.K.
Atlantique Maritime Patrol	France, Belgium
UH-1D Helicopter	
M-60-A1 Tank	Italy
Hawk (SAM)	(NATO) FRG, Belgium, France, Netherlands, Italy
Sidewinder (AAM)	(NATO) FRG, Belgium, Greece, Netherlands, Norway, Portugal, Turkey (NATO) U.K., Denmark, Turkey
Bullpup	Canada, Italy, France U.K., U.S., FRG
MK 44 Torpedo	France
VSTOL Fighter RD	France
Mirage III-V	France
Breguet 941 STOL Transport	France
TF-30 Engine	U.K.
Beryllium in Engines-RD	U.K.
Harrier VSTOL Fighter	Canada
CF-104	

TABLE I (Continued)

<u>Project</u>	<u>Countries</u>
CF-5 Transport	Canada
CV-7A Buffalo	Canada
XM-571 Tracked Vehicle	Canada
F-111	Canada
C-5	Canada, U.K.
F-4	U.K.
C-130	U.K.
F-104S	Italy
Fast Patrol Hydrofoil Craft	(NATO) FRG, Italy
Harpoon	(NATO)
AWACS	(NATO)
Air Cushion Landing System-RD	Canada
SLAR (UPD-X)-RD 1975	FRG
RPV-RD 1972	FRG
Advanced Flight Control Technology-RD 1972	FRG
Cartography Technology - RD 1972	FRG

Source: The above mentioned cases of codevelopment or coproduction were extracted during the literature search from various studies and research works listed in the bibliography.

implementation of past and/or future efforts of cooperation (see Table II). Some of the factors were mentioned by multiple authors or researchers and others by only one. No attempt was made to categorize these factors as relevant or irrelevant. They were listed as having been determined important in the study or research from which they were extracted.

Formal alliances already in existence or in process of conclusion were regarded as being important by four of the researchers. Cornell credited the

TABLE II

**FACTORS AFFECTING COOPERATION IN
CODEVELOPMENT/COPRODUCTION PROJECTS**

<u>Factors</u>	<u>Authors/Researchers</u>
Formal Alliances in Existence	Cornell, Vandevanter, Behrman, Young
Policy on Arms Transfers	Winn and Dunlap
Willingness of U.S. to Cooperate	Cornell
Concern for Balance of Payments (National Cash Flows) in Imports/Exports	Comptroller, Coleman, Hunter, Haugh, BMI, Catledge and Knudsen, Dolins, Vandevanter
Costs of Production	Biederman, Dolins, Hall and Johnson, Smith, Wilansky
Total Share Costing	Wilansky, BMI, Cornell, Dolins, Fifer, McLaren, Pincus, Vandevanter, Haugh, Catledge and Knudsen, Hunter, Coleman, Hall and Johnson, Howard, McLaren, Oh
Willingness to Share Technology	Banas and Reid
Ability to Share Technology	Dolins, Cornell
Competition for Prime Contractor	Berry and Peterson, Wilansky
Specific and Candid Guidelines for Implementation of Coproduction	
Transfer Agreement Supports Policy?	West Point, Hanke
Private Sales or Government?	Vandevanter
Economies of Scale	Vandevanter
Formal Commitment for Research or Production	Vandevanter
Important to National Prestige	Vandevanter, Catledge
Development of Home Industry	Vandevanter, Catledge and Knudsen, Coleman, Hunter
Government Seeking to Expand Employment Base	Vandevanter, Hunter
Tax Returns to Government	Vandevanter
Support Facilities (infrastructure)	McLaren

TABLE II (Continued)

<u>Factors</u>	<u>Authors/Researchers</u>
Ability to Meet Financial Obligations under the Agreement	Pincus, Young
National "Wants"	Coleman, Banas and Reid, Catledge and Knudsen
GNP Per Capita	Robock and Simonds
Contracts for Secondary Industries	Catledge and Knudsen, Vandevanter
Calculating Political Risks	Root
a. War (revolution or coup d'etat) (stability)	Comptroller General, Young
b. Expropriation (Multi-national)	
c. Taxation, exchange control (Home Industry Protection)	
d. Import restrictions (Home Industry Protection)	
Sufficient Production Base to Warrant Achievement	Wilansky
Active Joint Government/ Industry Management Teams	Wilansky
Common Political Goals	Comptroller, Young
Support U.S. Objectives	Comptroller, Young
Internal Stability of Recipient Country	Comptroller
Consistent with Recipient Development Goals	Comptroller, Coleman
Overflight and Access Rights	Comptroller
Impacts on U.S./Allied Governments Readiness to participate in Armed Conflict	Comptroller
Lack of Agreement on Relevant National Standards	Bunter

existence of the NATO alliance with providing the place and opportunity to study each other's needs and become aware of each other's intentions. It provided the necessary forum for free talk, both formal and informal, arguments, contacts, consultations and exchanges of ideas and techniques.¹ Behrman saw the need to tie regional cooperation to assistance programs for political, strategic and economic reasons.² Vandevanter in looking at the NATO alliance noted some definite advantages. Parliaments were more willing to fund alliance-approved weapons. Companies were spared many tax and customs problems, had easier access to classified materials, and received some quasi-diplomatic privileges. Some countries tended to believe that projects under an alliance strengthen that alliance.³ Young in examining Department of State concerns about requests for foreign military sales (FMS) found that a primary question was whether or not the requesting

¹Alexander H. Cornell, "An Analysis of International Collaboration in the Organization and Management of Weapons Co-production," (Doctoral dissertation, American University, Washington, D.C., 1969), p. 697.

²Jack W. Behrman, "Foreign Aid as a Technique in Attaining United States International Economic Objectives," (Doctoral dissertation, Princeton University, 1952), p. 52.

³Elliott Vandevanter, Jr., International Logistics: Interallied Collaboration in Weapons Production (Washington, D.C.: Industrial College of the Armed Forces, 1967), p. 34.

nation was an ally or could be relied upon to support the U.S. in most international debates and conflicts.⁴

Policy on arms transfers as a factor was mentioned by Winn and Dunlap. In their research it was mentioned negatively as something that was missing from U.S. policy and that was needed for the proper guidance of the entire FMS program, not just proposals for offset agreements.⁵

Willingness of the United States to cooperate in offset proposals was mentioned by Cornell. He cites the French writer Richie in expressing a commonly held European belief that the United States is unwilling to truly share in offset agreements and support the best weapon system in a competition if it is not of U.S. design and manufacture.⁶

Concern for balance of payments or national cash flows in the import/export market was cited as a factor by numerous authors. As an example the Comptroller said:

⁴John R. Young, "Program Management for Foreign Military Sale" (Research report, Defense Systems Management School, Fort Belvoir, VA, 1975), p. III-2.

⁵Lynton T. Winn, and James J. Dunlap, "Foreign Military Sales Legislation: Impact on the Achievement of United States Foreign Policy Objectives and Its Implication for the Department of Defense" (Master's thesis, Air Force Institute of Technology, 1975), pp. 104-105.

⁶Alexander H. Cornell, op. cit., pp. 643, 650-651.

DOD policy provides that preference be given to those programs in which adverse balance-of-payments efforts can be minimized or avoided. Some of our allies also appear to take this view regarding their own balance of payments. Thus, balance-of-payments considerations have become a crucial negotiating point in determining cost- and effort-sharing arrangements on cooperative programs and could be an obstacle to starting programs.

Balance-of-payments problems may be minimized to some extent through the offset technique. This involves allocating cost and effort in such a manner that currency outflows balance the inflows.⁷

Similar statements that will not be footnoted here were made by Coleman, Hunter, Haugh, Battelle Memorial Institute, Catledge and Knudsen, Dolins, and Vandevanter.

Costs of production were mentioned as a factor by five authors/researchers. Biederman in his treatise on decreasing costs states they "are a major force shaping international trade and cooperation in aerospace products."⁸ Dolins in writing of share-costs in joint international ventures tells us that there are two lessons worth remembering about share-costing.

The first is that the share-costing effort should reflect in its criteria the purpose and the goal of the joint venture and the composition of the

⁷U.S., Comptroller General, Benefits and Drawbacks of U.S. Participation in Military Cooperative Research and Development Programs, Report to the Congress, [by R. M. Keller]([Washington]: n.n., 1973), p. 116.

⁸Harry R. Biederman, "The Influence of Decreasing Costs on International Trade and Cooperation in Aerospace Products" (Doctoral dissertation, Columbia University, 1968), p. 6.

membership. The second is that the philosophy for sharing be thoroughly explored and that the model be designed by fiscal experts rather than by diplomatic representatives of the interested power blocs.⁹

Hall and Johnson discuss the methods of accounting for total production costs and the importance of attributing costs to the appropriate basis.¹⁰ Smith devotes his entire research effort to the problem of costing joint production using an example from the petroleum refining industry.¹¹ Wilansky treats procurement and share-costing of coproduction efforts through the legislative, internal protectionist, and treaty, external free-trade, forces affecting attempts to develop offset agreements for coproduction. Using NATO as a specific example he shows how policy changes that affect share-costing can have an electric effect on the size of the market and eventual cost of weapon systems.¹²

⁹Stanley L. Dolins, "The Economic Allocation of Share-Costs in Joint International Ventures: An Examination of the NATO and OECD-DAC Experience," (Doctoral dissertation, Univ. of Colorado, 1965), pp. 31-32.

¹⁰G. R. Hall and R. E. Johnson, "Aircraft Co-Production and Procurement Strategy," (Research report, Rand Corporation, Santa Monica, Cal., 1967), pp. 159-160.

¹¹Langford W. Smith, Jr., "An Approach to Costing Joint Production Based on Mathematical Programming with an Example from Petroleum Refining" (Doctoral dissertation, Leland Stanford Univ., 1962).

¹²Nathan L. Wilansky, "Report on Issues Pertaining to United States Foreign Procurements and Co-

Total share costing, like balance of payments, was mentioned as a factor by numerous authors. Two examples are given for illustration. Fifer discusses total costs of weapons systems and the recovery of costs through broadened FMS programs. She divides costs savings into research and development cost recovery and lowered unit production costs.¹³ Pincus finds understanding of the area of cost-sharing so confused that he devotes an entire section of his report to that subject under the title of "The Meaning of Burden Sharing." He says:

In general, members of an alliance will be most willing to accept a common budget: (1) when the job to be done cannot be carried out by individual national action, or could be so carried out only at a cost that seems prohibitive compared with the benefits (UN headquarters and NATO infrastructure are cases in point); (2) when members see more political advantages in a jointly financed than in an individual action; and (3) when the sums involved are insignificant in relation to national budgets or incomes.¹⁴

Willingness to share technology by the firm and country possessing the desired capability is a

production Programs," in University of Virginia Conference on Procurement and Grants Management Proceedings of the 1976 International Conference on Procurement and Grants Management Held at the Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976, pp. 107-108.

¹³ Sheila K. Fifer, "Foreign Military Sales and U.S. Weapons Costs." (Unpublished staff paper, Congressional Budget Office, Washington, D.C., 1976), pp. 9-10.

¹⁴ John Pincus, "Economic Aid and International Cost Sharing," a report prepared for the Office of the Assistant Secretary of Defense, International Security

factor that was listed by four of the researchers. Hall and Johnson discuss the factors that affect the willingness of firms to share technology. In general, they postulated that firms that had processes protected by patents and operated in open markets tended to be willing to share technology while those that did not have protected rights and operated in oligopolistic or monopolistic markets would tend to resist sharing technology. They included in the technology sharing both ideas and products.¹⁵ Howard describes willingness to share technology from a country view. He shows that the policy established by the Nixon Doctrine is to cooperate in research, development and production and describes enabling activities that include engineer exchanges, data exchanges, joint research and testing, codevelopments and information exchange forums.¹⁶ McLaren quotes the following U.S. policy:

Increased NATO cooperation in research and development has been an announced objective of the United States for many years. Our goal is to achieve the best possible utilization of the scientific and technical resources of our allies in satisfying requirements for increasingly complex and costly military equipment and to

Affairs (Santa Monica, California: Rand Corporation, 1965), p. 53.

¹⁵G. R. Hall and R. E. Johnson, op. cit., pp. 48-50.

¹⁶Joe A. Howard, "Transfer of Technology Between Developed Nations: An Analysis of USAF International Cooperative R&D" (Doctoral dissertation, The George Washington University, 1974), pp. 3-4.

avoid costly duplication of R&D efforts within the Alliance.¹⁷

He also includes a section on the legal protection of privately owned patents and proprietary information to assuage any reticence to share technology.¹⁸ Oh in speaking to willingness to share technology said the following:

Increasingly we are learning that the non-human inputs into the expansion process--the steel and energy of industrialization and the endowments of nature, the raw materials from which they come--are much less important than the motivation of and drive of leaders of government and enterprise, to say naught of workers themselves.¹⁹

Ability to share in technology is described as a factor by Banas and Reid. It was recognized by the government of the Republic of China (Taiwan) early in their coproduction agreement with Northrop involving the F-5E aircraft. In the contract signed between the Chinese Air Force and Northrop in 1972, it was stipulated that Northrop would conduct a survey "to

¹⁷ William D. McLaren, United States Defense Industry Guide for Conducting Business with NATO Organizations and Member Countries (Washington, D.C.: U.S. Government Printing Office, 1971), p. 15.

¹⁸ Ibid., pp. 35-36.

¹⁹ W. Malenbaum, "The Asian Economic Potential," Annals of the American Academy of Political and Social Science 318 (July), 1958, p. 20, as quoted in Moonson Oh, "The Role of International Corporations in the Transfer of Technology to Developing Countries" (Doctoral dissertation, University of Pennsylvania, 1970), p. 5.

establish and document the existing industrial, technical, and human resources baseline."²⁰

Competition for prime contractor is mentioned as a factor by Dolins and by Cornell. Dolins mentions the fears of participating nations in joint share-costings that one of their members "might cook his own soup on the common stove."²¹ Cornell addresses the basic psychological value of pride in national product involved in purchases of the Atlantique antisubmarine warfare aircraft. He lists countries, including the U.S. that refused to purchase weapons because their design or their prime contractor was not chosen.²²

Specific and candid guidelines for implementation of coproduction was a factor that developed from past experiences. Berry and Peterson in their research of the U.S. and Federal Republic of Germany RF-4 coproduction agreement said the following:

The authors believe that the only major problem in the co-production effort stemmed from the lack of specific and objective guidelines in the Agreement. Although, there was

²⁰ John M. Banas and James R. Reid, "A Case History of the Co-production of the F-5E Aircraft by the United States of America and the Republic of China," (Master's thesis, Air Force Institute of Technology, 1975), p. 21.

²¹ Stanley L. Dolins, op. cit., p. 32.

²² Alexander H. Cornell, op. cit., pp. 637-643.

some confusion over the meaning of "best efforts," it became relatively unimportant when compared to the administrative difficulties caused by the lack of detailed parameters and criteria to determine what type of co-production contracts would be credited toward the \$125M offset.²³

Governmental support, nay direction, to develop such guidelines is quoted from Wilansky:

The Senate expected the DOD to be energetic and creative in developing plans and programs for specialization, sharing of efforts, and co-production arrangements to carry out the announced policy [of standardization]. Cooperation between the U.S. and its NATO allies in research and development was regarded as an important and integral part in increasing standardization and interoperability of NATO military equipment.²⁴

An important factor from a national policy perspective is to ensure that the transfer agreement supports current and projected policy. Hanke says the following:

Arms have long been the symbol as well as the instrument of national power--used directly and indirectly by the advanced states to enhance their interests, and coveted by the less advanced states to enhance their prestige and bargaining power, both among one another and with advanced powers.

²³ Arnold M. Berry and Edward A. Petersen, "RF-4 Co-production: United States and Federal Republic of Germany" (Master's thesis, Air Force Institute of Technology, 1975), p. 94.

²⁴ Nathan L. Wilansky, "Report on Issues Pertaining to United States Foreign Procurements and Co-production Programs," in University of Virginia Conference on Procurement and Grants Management, Proceedings of the 1976 International Conference on Procurement and Grants Management Held at the Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976, pp. 105-106.

Arms trade supports specific foreign policy and national security interests of the United States.²⁵

That this is an important factor, that may impinge on U.S. policy, was clearly stated at the West Point Conference on Arms Transfers. It was acknowledged that "the U.S. is leading the worldwide arms transfer boom, and foreign policy dilemmas are increasingly apparent in this area."²⁶

In his research Vandevanter listed a number of factors affecting cooperation in codevelopment/coproduction projects. He was the sole researcher to support private sales over government, list economies of scale, formal commitments for research on production, importance to national prestige and importance of tax returns to the government. He was supported by other researchers in listing development of home industry and government wishes to expand the employment base as factors.²⁷ The development of home industry factors

²⁵William B. Hanke, "The Role of Arms Trade in a Changing World Environment," (Research memorandum, Strategic Studies Institute, Army War College, 1976), p. 1.

²⁶U.S. Military Academy Conference on Arms Transfers, Final Report of the Senior Conference on Arms Transfer Held at the United States Military Academy, West Point, New York, June 10-12, 1976 (West Point, New York: 1976), p. 1.

²⁷Elliott Vandevanter, Jr., op. cit., pp. 2-15, 31, 56.

is supported by Catledge and Knudsen, Coleman, and Hunter.²⁸ The expansion of employment base factor is supported by Hunter.²⁹

McLaren listed infrastructure as a factor in his guide for doing business with NATO. Infrastructure pertains to facilities that are for joint use of two or more member countries. This could be particularly pertinent to codevelopment and coproduction facilities in which the U.S. and Foreign Governments are deeply involved.³⁰

Ability to meet financial obligations under the agreement is a factor that was listed by two of the authors. Pincus in his treatise on economic aid and share-costing looks into the ability of the rising third world nations to participate in share-costing ventures. He says that "countries now facing foreign exchange stringencies will generally have to turn, as

²⁸ Morris B. Catledge and Larrie F. Knudsen, "Foreign Military Sales: United States Involvement in Co-production and Trends Toward Co-development," (Master's thesis, Air Force Institute of Technology, 1969), p. 6; James T. Coleman, et al., "On Some Aspects of Foreign Military Sales" (Research report, Air Command and Staff College, Air University, 1975), p. 39; George F. Hunter, "An Evaluation of USAF Cooperative R&D" (Research report, Defense Systems Management School, Fort Belvoir, Virginia, 1975), p. 13.

²⁹ George F. Hunter, op. cit., p. 10.

³⁰ William D. McLaren, op. cit., pp. 22-24.

in the past, to more rapid growth of exports of commodities and manufactures, to an accelerated pace of import substitution, or to increased capital flows from abroad."³¹ Young simply asks if they have the capability for cash payment.³²

National "wants" was listed as a factor by several of the researchers. In the case of the industrialized nations it was expressed as desire to expand the employment base or to support home industry and has already been covered. But the desire also exists in the lesser developed countries and was addressed by Coleman, Catledge and Knudsen, and Banas and Reid. Coleman says "investment in research and development will not rise dramatically in the less developed nations but the demand for local production through license agreements will."³³ Catledge and Knudsen arrive at the same point but more circumspectly. They say that the U.S. is no longer a sole supplier of arms able to tell other nations what they need and how to get them. They then launch into the requirement for the U.S. to consider codevelopment and coproduction

³¹John Pincus, op. cit., p. 18.

³²John R. Young, op. cit., p. II-4.

³³James T. Coleman, op. cit., p. 49.

with both developed and less developed nations.³⁴

Banas and Reid say that "co-production opportunities are being sought by the lesser developed countries to increase their industrial base while at the same time fulfilling their defense needs."³⁵

Gross National Product (GNP) per capita is a factor addressed by Robock and Simmonds. They use it as an indicator to determine development gap between the developed and less developed countries as a means of explaining ". . . the aspirations of the less developed countries for a greatly accelerated rate of economic progress, toward which international enterprise can make valuable contributions."³⁶

Contracts for secondary industries was a subtly mentioned factor that was introduced by two authors in the literature search. Catledge and Knudsen mentioned it as the ability to produce part of the equipment in-country.³⁷ Vandevanter said that "... it

³⁴Morris B. Catledge and Lorrie F. Knudsen, op. cit., pp. 1-8.

³⁵John M. Banas and James R. Reid, op. cit., p. 1.

³⁶Stefan H. Robock and Kenneth Simmonds, International Business and Multinational Enterprises (Homewood, Illinois: Richard D. Irwin, Inc., 1973), pp. 275-283.

³⁷Morris B. Catledge and Lorrie F. Knudsen, op. cit., p. 133.

has been pointed out that the smaller nations, whose industries could not produce entire weapon systems, and who might be squeezed out in unrestricted competition among the big manufacturers, could participate in NATO-wide programs as subcontractors.³⁸

Root in his treatise on calculating political risks for international business listed five factors that affected the area of offsets. He mentioned war, revolution or coup d'etat which was concerned with stability. Secondly, he mentioned expropriation risks. He also listed three factors, taxation, exchange control and import restrictions, that were designed to support home industries.³⁹ The importance of stability as a factor was supported by Young and the Comptroller General.⁴⁰

Wilansky in his report on issues in U.S. foreign procurements and coproduction programs at the University of Virginia Conference on Procurement and Grants Management in 1976 listed two factors that have impacted past coproduction programs. One was

³⁸ Elliott Vandevanter, Jr., op. cit., p. 5.

³⁹ Franklin R. Root, "Analyzing Political Risks in International Business" in A. Kapoor and Phillip D. Grub, eds., The Multinational Enterprise in Transition. (Princeton, N.J.: The Darwin Press, 1972), pp. 356-357.

⁴⁰ John R. Young, op. cit., p. III-3; U.S. Comptroller General, Foreign Military Sales--A Growing Concern, Report to the Congress [by Reuben P. Atasta] ([Washington, D.C.): n.n., 1976), p. 13.

possession of a sufficient production base by the technology importing nation to warrant achievement and the other was early establishment of active joint government/industry management teams.⁴¹

The Comptroller General of the United States in a report on growing concerns in foreign military sales listed six factors that were necessary considerations to any foreign military sales to include codvelopment and coproduction. The foreign government requesting an agreement must have common political goals with the United States (also listed by Young⁴²). The sale must support U.S. objectives (also listed by Young⁴³). The current internal stability of the recipient country and its capacity to maintain that stability must be considered. The proposed agreement must be consistent with recipient development goals (also listed by Coleman⁴⁴). Would the agreement support U.S. overflight rights or access to facilities? And, finally, would the agreement impact on U.S. or allied government readiness to participate in armed

⁴¹Nathan L. Wilansky, op. cit., pp. 109-110.

⁴²John R. Young, op. cit., pp. III-2 and III-3.

⁴³Ibid., p. III-2.

⁴⁴James T. Coleman, et al., op. cit., p. 18.

conflict?⁴⁵

The final factor found in the research was listed by Hunter as a need for agreement on relevant standards.⁴⁶ Differences in systems of weights and measures and in standards for materials were found to pose substantial problems.

Aggregation of the Variables

The individual factors found during the literature review were next aggregated into a total of 17 variables by consolidating those factors with identical or similar meanings. The first variable, internal stability of the recipient country, expressed the factor of war, revolution or coup d'etat from Root and the requirement for stability in the Comptroller General and Young.

The second variable, important to national prestige, combined the factor by that name from Vandevanter and the factor on national "wants" from Coleman.

The third variable, transfer agreement supports policy, combined a number of factors under the title of the factor from the West Point Conference on Arms Transfers. Other factors included promotion of private sales over government from Vandevanter, active joint

⁴⁵U.S. Comptroller General, Foreign Military Sales--A Growing Concern, op. cit., pp. 13-14.

⁴⁶George F. Hunter, op. cit., p. 11.

management teams from Wilansky, specific and candid guidelines for implementation of ceproduction from Berry and Petersen, and Wilansky, and policy on arms transfers from Winn and Dunlap.

Government seeking to expand its employment base was the fourth variable. It included the factor of the same name from Coleman, Hunter, Pincus and Vandevanter. Also included were the factor on competition for prime contractor from Cornell, and Dolins and contracts for secondary industries from Vandevanter, and Catledge and Knudsen.

The fifth aggregated variable was development of home industry from the factor of that name from Catledge and Knudsen, Coleman, Hunter, and Vandevanter. It also included the factors tax returns to government from Vandevanter, taxation, exchange control of imports and import restrictions from Root.

The sixth variable, participating countries made formal commitment for development production was taken directly from the factor of the same name in Vandevanter.

The seventh variable, willingness to share technology, was from that factor in Catledge and Knudsen, Coleman, Haugh, Howard, Hunter, McLaren, Oh, and Hall and Johnson. It also included the factor, willingness of the U.S. to cooperate, from Cornell.

The eighth variable, formal alliances in existence, came from that factor in Behrman, Cornell, Vandevanter, and Young. It included the factors common political goals and supports U.S. objectives from Young. It also included the factors consistent with foreign government (FG) goals (U.S. Government determined) from Coleman, the Comptroller of the U.S. and Young and policy on arms transfers from Winn and Dunlap.

Variable nine, overflight and access rights, came from the factor of that name in Comptroller of the U.S.

Concern for the impact of balance-of-payments (BOP) in imports/exports, variable ten, came from the identically named factor in Comptroller of the U.S., Battelle Memorial Institute, Catledge and Knudsen, Coleman, Dolins, Haugh, Hunter, and Vandevanter.

Variable 11, economies of scale was the factor by that name in Vandevanter.

Expropriation, variable 12, was a factor from Root.

Gross national product (GNP) per capita, variable 13, was the factor in Robock and Simonds.

Variable 14, ability to share technology, from the factor in Banas and Reid also included the support

facilities (infrastructure) factor in McLaren and the sufficient production base to warrant achievement factor from Wilansky.

Ability to meet financial obligations under the agreement, variable 15, came from the factor in Pincus. Also included were the total share costing factor from Battelle Memorial Institute, Cornell, Dolins, Fifer, McLaren, Pincus, Vandevanter, and Wilansky, and the costs of production (shared production or coproduction) factor in Biederman, Hall and Johnson, Dolins, Haugh, Smith, and Wilansky.

Variable 16, lack of agreement in relevant national standards, came from the factor of that name in Hunter. Included in this variable are the differences between the English (American) and Metric systems of weights and measures and differing national standards for materials such as sheet metals, plate, wire, electronic components and engineering drawings.

The 17th, and final, variable, impacts on U.S./ Allied Governments readiness to participate in armed conflict, was taken from the factor in the Comptroller of the U.S.

Classification of the Variables

The variables were then examined to see if they could be classified as either political, economic or national security factors. The writer determined variables 1, 2, and 3 to be purely political factors;

variables 10, 11, 12, and 13 to be purely economic factors; and variable 17 to be the only pure national security factor. The remaining ten variables were confounded in that nine were combinations of two of the three factors and variable 7 was a combination of all three. Ignoring factor interaction the 17 variables represent nine political, eleven economic and seven national security factors. (See Table III.)

TABLE III

VARIABLES AFFECTING COOPERATION BY POLITICAL,
ECONOMIC, NATIONAL SECURITY FACTOR

<u>Factor(s)</u>	<u>Variables</u>
Political	1. Internal Stability of recipient Country - Comptroller History of revolution or coup d'etat - Root
Political	2. Important to National Prestige - Vandevanter National "Wants" - Coleman
Political	3. Transfer Agreement supports policy - West Point Conference - Hankee Promotion of Private Sales over Government - Vandevanter Active Joint Management Teams - Wilansky Specific and Candid Guide- lines for implementation of co-production - Berry and Petersen, Wilansky Policy on Arms Transfers - Winn and Dunlap

TABLE III (Continued)

Political Economic	4. Government seeking to expand its base - Coleman, Hunter, Pincus, Vandevanter Competition for prime contractor - Cornell, Dolins Contracts for secondary industries - Catledge and Knudsen
Political Economic	5. Development of home industry - Catledge and Knudsen, Coleman, Hunter, Vandevanter Tax returns to government - Vandevanter Taxation, exchange control of imports - Root Import restrictions - Root
Political Economic	6. Participating countries made formal commitment for development/products Vandevanter
Political Economic Nat'l Security	7. Willingness to share technology - Catledge and Knudsen, Coleman, Hall and Johnson, Haugh, Howard, Hunter, McLaren, Oh Willingness of U.S. to cooperate - Cornell
Political Nat'l Security	8. Formal alliances in existence - Behrman, Cornell, Vandevanter, Young Common political goals - Comptroller, Young Support U.S. Objectives - Comptroller, Young Consistent with FG Goals (USG determined) - Coleman, Comptroller, Young Policy on Arms Transfers - Winn and Dunlap
Political Nat'l Security	9. Overflight and Access Rights - Comptroller

TABLE III (Continued)

<u>Factor(s)</u>	<u>Variables</u>
Economic (Nat'l Cash Flows)	10. Concern for Balance of Payments in imports/exports - Battelle Memorial Institute, Catledge and Knudsen, Coleman, Comptroller, Dolins, Haugh, Hunter, Vandeventer
Economic	11. Economies of Scale - Vandevanter
Economic	12. Expropriation - Root (Not of concern)
Economic	13. GNP per capita - Robock and Simonds
Economic Nat'l Security	14. Ability to share technology - Banas and Reid Support Facilities (infrastructure - McLaren) Sufficient production base to warrant achievement - Wilansky
Economic Nat'l Security	15. Ability to meet financial obligations under the agreement - Pincus Total share costing - Batelle Memorial Institute, Cornell, Dolins, Fifer, McLaren, Pincus, Vandevanter, Wilansky Costs of production (Shared Production or coproduction) - Biederman, Dolins, Hall and Johnson, Haugh, Smith, Wilansky
Economic Nat'l Security	16. Lack of agreement on relevant National Standards - Hunter
Nat'l Security	17. Impacts on U.S./Allied Governments' readiness to participate in Armed Conflict - Comptroller

The variables were then looked at in two ways, their desirability to the nations involved and their essentiality to implementation or non-implementation of a proposal for offset. In looking at the desirability to the nations involved, four categories were established: Both, Prov for the nations providing the main technology, Recip for the recipient of the technology transfer, and Neither if the variable was either unimportant or inappropriate to the nations (See Table IV). Eight variables were assigned to Both, five to Prov, three to Recip, and one, variable 12, expropriation, to Neither.

In looking at the variables in terms of their essentiality to implementation or non-implementation, three categories were established: Yes, No, and Maybe (Table IV). Ten variables were assigned to Yes, two to No, and five to Maybe. Variable 12, expropriation was one of the variables deemed not important to implementation or non-implementation. Since negotiations occur between governments for research, development and/or production in home country plants, expropriation is not a factor of business and will not be considered in any analysis. The other variable assigned to No was number 9, overflight and access rights. Since it has both political and national security implications to the providing nation, it will

TABLE IV

VARIABLES CATEGORIZED BY (A) DESIRABILITY
AND (B) ESSENTIALITY

A. Variables Desirable to: Nations

Both

3. Transfer agreement supports policy
4. Government seeking to expand its employment base
6. Formal commitment for development/production
7. Willingness of provider to share technology
10. Concern for Balance of Payments
11. Economies of scale
16. Lack of agreement on relevant National Standards
17. Impacts on U.S./Allied Governments' readiness to participate in armed conflict

Provider Nation (Prov.)

1. Internal stability of recipient country
2. Formal alliances in existence
9. Overflight and access rights
13. GNP per capita
15. Ability of recipient to meet financial obligations under the agreement

Recipient Nation (Recip.)

2. Important to national prestige
5. Development of home industry
14. Ability to share technology

Neither

12. Expropriation

B. Variables Important to: Implementation or Non-implementation

Yes

1. Internal stability of recipient country
3. Transfer agreement supports policy
4. Government seeking to expand employment base
5. Development of home industry by recipient

TABLE IV (Continued)

- 6. Participating countries made formal commitment for development/production
- 7. Willingness to share technology
- 10. Concern for balance-of-payments
- 11. Economies of scale
- 14. Ability to share technology
- 17. Impacts on U.S./Allied Governments' readiness to participate in armed conflict

No

- 9. Overflight and access rights
- 12. Expropriation

Maybe

- 2. Important to national prestige
- 8. Formal alliances in existence
- 13. GNP per capita
- 15. Ability to meet financial obligations under the agreement
- 16. Lack of agreement on relevant National Standards

Note: Numbers are those assigned to the variables in Table III.

be addressed in the analysis. All of the variables in the category Maybe are important to the negotiating nations and will be included in the analysis.

Stability Factors and Model Development

Internal stability was listed as an important variable by the Comptroller General⁴⁷ in considering codevelopment and coproduction and was

⁴⁷U.S. Comptroller General, Foreign Military Sales--A Growing Concern, op. cit., p. 13.

listed by Root⁴⁸ as an important variable in any international business. However, in looking for a definitive description of a stable government or national stability, none was found. This prompted a mini-study in political socialization in search of clearly definable factors of national stability. No existing scale of factors was located during the research but a list of 35 internal stability factors was compiled. (See Table V.) The description of the literature search for a scale of stability and amplification of the factors that were located in that search have already been described in detail in Chapter Two. Here we will briefly reiterate the source of each factor and proceed with the development of our model for stability and with our research procedure.

Tapper⁴⁹ in his research provided the stability factors of mass socialized support, elite recruitment and socialization, system of personal rewards and disadvantages, ability of the elite to control and stimulate demands, maintenance and/or persistence in a social system, and, finally, from Lijphart, lack of

⁴⁸Franklin R. Root, op. cit., pp. 356-357.

⁴⁹Ted Tapper, Political Education and Stability: Elite Responses to Political Conflict (London: John Wiley and Sons, Ltd., 1976), pp. 2-8.

TABLE V
FACTORS OF INTERNAL STABILITY

<u>Authors</u>	<u>Stability Factors (See Note)</u>
Tapper	1. Mass support (Socialized)
Tapper	2. Elite recruitment and socialization
Tapper	3. Personal rewards and disadvantages
Tapper	4. Control/stimulate demands
Tapper	5. Maintenance and persistence
Tapper	6. Lack of sharp cleavages (Lijphart)
Milnor	7. Plurality vs. proportional
Milnor	8. Extent of citizen involvement
	a. Symbol identification
	b. Heroes
	c. "Deification" of leaders
	d. Creation of external hostile forces
	e. Electoral process
Hughes	9. Political socialization (Long term)
Hughes	10. War, depression, etc. (Short term)
Nordlinger	11. Party based conflict regulation
	a. Stable governing coalition
	b. Proportionality
	c. Mutual veto
	d. Purposive depoliticization
	e. Compromises
	f. Concessions
Grinter	12. Salience of power (leadership)
Grinter	13. Culture and social forces (socialization)
Grinter	14. Politics (citizen involvement)
Pirages	15. Outlets for competition
Pirages	16. Rules, sanctions and sanctioned rule relief
Pirages	17. Rising expectations?
	a. Resource and position scarcity
	b. Economic and psychological needs
	c. Race and Ethnicity
	d. Religion and Ideology
	e. Regionalism and Nationalism

TABLE V (Continued)

<u>Authors</u>	<u>Stability Factors</u>
Pirages	18. Economic Conditions; Inflation and Unemployment
Pirages	19. Strong leadership
Pirages	20. Conflict management
Pirages	21. Stability for the ruled
	a. Political apathy of the mass
	b. "Criterion of Competence"
	c. "Status Quo" most economical
	d. Group values
	e. Threat of force
	f. Tying authority to religious beliefs
	g. Ability of leaders to use moral suasion
	h. Management of socio political information
	i. Modification of individual beliefs (Long term)
Pirages	22. Lack of perception of relative deprivation
Liska	23. Sound economic basis
Rosen	24. External hostilities
Rosen	25. National self-image
Rosen	26. Lack of irredentism
Rosen	27. Sufficient space
Rosen	28. Economic potential
Rosen	29. Political potential
Rosen	30. Social assimilation
Rosen	31. Value sharing
Rosen	32. Mutual benefits
Stonier	33. Social climate all important
Stonier	34. Economic capacity basic to social climate
Stonier	35. Sufficient resources for population

Note: This table lists factors of stability without regard for whether they have a stabilizing or destabilizing effect.

sharp cleavages within the society.⁵⁰

Milnor's research was conducted in an area that he saw as reducing cleavages, the effect of elections on stability. In looking closely into the institution of the election, he noted several factors that contributed to stability. The first was the type of governmental system that existed. He compared the pros and cons of both plurality and proportional systems. In the end he had to give the nod for stability to the plurality system for while that system places obstacles in the path of minorities that can prevent their attainment of victory, it is usually tolerant enough to allow their ideology to be heard. Proportional systems on the other hand give representation to those minority ideologies that are present when the system is established but make it very difficult for any new ideological movement to attain any representation.⁵¹

Looking into the system, Milnor found that the electoral process was a factor in stability regardless of whether the system was one of plurality or proportionality.⁵² Milnor mentions four other techniques, or factors, that contribute to stability. These

⁵⁰Ibid., p. 23.

⁵¹Andrew J. Milnor, Elections and Political Stability (Boston: Little, Brown and Company, 1969), p. 103.

⁵²Ibid., p. 104.

techniques are partially identified with the electoral process and partially independent of it. He lists the national symbols, such as the flag or emblem, that the populace identifies with as one. The others are the parading of national heroes, canonization of independence leaders and unification of the populace through the identification, or creation, of some external hostile force.⁵³

In his research into political stability and political behavior, Hughes mentioned two main influences upon stability. One was the long term dispositions of group members that developed out of the socialization process and that were continually reinforced by association. This he considered the primary factor in political stability. Short term influences were, in his opinion, primarily destabilizing although they could be capable of unifying the population. He maintained that these influences had to be substantial and simple to understand such as war or depression.⁵⁴

Nordlinger approached the study of political stability from a slightly more direct perspective. He says the following:

⁵³ Ibid., p. 121.

⁵⁴ Colin A. Hughes, Political Stability and Political Behaviour. (St. Lucia, Queensland, Australia: University of Queensland Press, 1968], pp. 23-24.

The crucial problem in politics is the management of conflict. No regime could endure which did not cope with this problem. All politics, all leadership and all organization involve the management of conflict.⁵⁵

He proceeds from that point to outline his thesis that divided societies under severe stress are the ideal subjects for study of factors of stability.⁵⁶ Then through his study of societies with deep divisions Nordlinger identifies six conflict regulating practices. The first practice is the stable governing coalition that is formed prior to elections for the express purpose of maintaining conflict regulation. It does not include the post election marriages of convenience commonly found in coalition governments. The second practice is the principle of proportionality. It does not imply a proportional system of government, but its basic characteristic is that all groups influence a decision in proportion to their numerical strengths. The third practice listed by Nordlinger is the mutual veto. This practice provides that governmental decisions will not be taken unless they are acceptable to all major conflict organizations. This practice exists in less sharply divided societies

⁵⁵ Eric A. Nordlinger, Conflict Regulation in Divided Societies (Harvard University: Center for International Studies, "Occasional Papers in International Affairs," 29, 1972), p. 1.

⁵⁶ *Ibid.*, p. 2.

in the efforts that are expended to achieve consensus. Nordlinger's fourth listed practice is purposive depoliticization wherein conflict group leaders agree not to raise segmental, potentially explosive issues during campaigns. The fifth practice is compromise wherein the conflict groups mutually adjust their conflicting issues and values until a position is reached that can be accepted by all sides. The sixth and final practice is the granting of concessions by one or more, but not all, sides. Concessions must, of necessity, be granted by the stronger parties. They may also be considered by relatively equal conflict groups but are usually not effective. This last point is one that usually causes peril to a bad government and may lead to its dissolution.⁵⁷

Grinter studied the dissolution of stability in the Republic of Vietnam and observed American efforts to try and help to reestablish stable government. He identified three factors that were not considered and which he contends eventually led to the failure of the effort there. He said the following:

. . . Conventional bureaucratic military responses to revolutionary warfare do not work. They do not take into account the relevance of culture, social forces and, above all, politics. They perceive socioeconomic problems and political problems through technological and administrative filters.

.....

⁵⁷ Ibid., pp. 21-29.

Conventional liberal-democratic responses to revolutionary warfare do not work either. They underestimate the role of force and violence. They do not take into account the salience of power, the necessity of creating, centralizing, and institutionalizing power before it can be shared.⁵⁸

Pirages in his treatise on managing political conflict developed a sizeable number of factors that contribute to increased or decreased stability. Two of the factors, outlets for competition and rules, sanctions and sanctioned rule relief are closely related.⁵⁹ Five factors were attributed by Pirages to the rising expectations of people throughout the world. Pirages saw them as primarily destabilizing although he allowed for the possibility of them being at the center of a sentiment for stability. These five factors are resource and position scarcity, economic and psychological needs, race and ethnicity, religion and ideology, and regionalism and nationalism. Pirages says "all of the above factors . . . represent potential sources of conflict in different societies at different times. But conflict does not always result from seemingly volatile mixtures. Potential conflict can be dormant

⁵⁸ Lawrence E. Grinter, "Nation Building, Counterinsurgency and Military Intervention," in Ellen P. Stern, ed., The Limits of Military Intervention (Beverly Hills, California: Sage Publications, Inc., 1977), p. 251.

⁵⁹ Dennis Pirages, Managing Political Conflict (New York: Praeger Publishers, 1976), p. 7.

for decades if political leaders optimally use their managerial resources."⁶⁰

One of the above factors, race and ethnicity, plays a very important role in conflict in the developing nations according to Pirages. However, he finds this factor often submerged by another factor, economic conditions of inflation and unemployment, in industrial countries.⁶¹ This last factor can spell the downfall of governments in industrialized countries. Manipulating the environments to avoid conflict is the goal of political leaders and usually requires strong leadership, another of Pirages factors.⁶² The process of manipulating the environment is also one of Pirages factors which he labels as conflict management.⁶³

In looking at various factors that help to maintain political stability among masses and thus keep the elites in power, Pirages assigned the following attributes to society. For the masses the important factors were the tendency for large numbers of the populace to be politically apathetic, the criterion of competence assigned to others with special knowledge, the economy of maintaining the status quo, and

⁶⁰Ibid., p. 12

⁶¹Ibid., p. 13.

⁶²Ibid., pp. 13, 27.

⁶³Ibid., p. 15.

response of the government to group values.⁶⁴ For the ruling elites the important factors were the capacity to use force, the tying of authority to religious beliefs, ability of leaders to use moral suasion solely, management of sociopolitical information, and the modification of individual belief systems.⁶⁵

The final factor obtained from Pirages' research was the lack of perception of relative deprivation. Stress can be caused "by feelings of relative deprivation . . . which is related to rising expectations that cannot be met within existing structures of opportunity. Stress leads to frustration and violence which is often manifest in political instability."⁶⁶

Liska in his study of third world countries in evolution tied stability firmly to the economic basis of the developing nation.⁶⁷

Rosen, in his study of international relations, relies heavily on the study of conflict and conflict resolution. One factor, sufficient space, that he does not mention explicitly, is implicitly contained

⁶⁴ Ibid., pp. 28-31.

⁶⁵ Ibid., pp. 36-37.

⁶⁶ Ibid., p. 57.

⁶⁷ George Liska, States in Evolution: Changing Societies and Traditional Systems in World Politics, Studies in International Affairs Number 19. (Baltimore: The Johns Hopkins University Press, 1973), p. 102.

in his examination of the world population explosion.

The squeeze on space is brought out by these words:

The LDCs are caught in a transitional bind. They have reached the point in modernization where the death rate drops, but not yet the point where the birth rate goes down. Thus, their population growth is much more rapid than it once was, and far exceeds the population growth of the richer countries.⁶⁸

Considering further the position of the Lesser Developed Countries (LDC's) vis-a-vis stability, Rosen mentions three factors that can have a profound effect; external hostilities, irredentism and national self-image.⁶⁹ Rosen expressed those factors as being peculiar to the needs of LDC's to procure military armaments. But a cursory examination of the daily newspapers showed that they were equally applicable to the larger industrialized nations as well.

In exploring integration as a technique for reducing conflict, Rosen developed five additional factors for maintaining stability. First was the ability to maximize economic potential by developing competitive techniques. This was closely followed by the ability to maximize political potential by entering into alliances that support foreign policy goals. To support these two factors it was necessary

⁶⁸Steven J. Rosen, and Walter S. Jones, The Logic of International Relations, 2d ed., (Cambridge, Mass.: Winthrop Publishers, Inc., 1977), p. 132.

⁶⁹*Ibid.*, p. 133.

for the following three factors to pre-exist and form a sub-strata. These include social assimilation, which is tolerance of cultures and sub-cultures, value sharing and an expectation of mutual benefit by the various sectors of the society.⁷⁰

Stonier took a quick macro-look through history in his research into the prerequisites for political and military stability. He had two basic and intertwining factors for stability with a third factor that was an offshoot of one of the more basic factors. The basis for Stonier is a question of the economic capacity of a particular geographic area. Upon this is built the social climate that determines stability or instability. Any change in sufficiency or utilization of resources can then affect changes in the basic structure of the society and cause instability.⁷¹

The factors in Table V were next consolidated into a model of aggregated stability factors that was divided into two parts, mass support and elite leadership (Table VI). This model was presented in the dissertation proposal that was presented to the

⁷⁰ Ibid., pp. 383-387.

⁷¹ Tom Stonier, "Economic and Technological Prerequisites for Achieving Political and Military Stability," in Carlton, David and Carlo Schaerf, eds., Arms Control and Technological Innovation (New York: John Wiley and Sons, Halsted Press, 1976), pp. 342-355.

TABLE VI
AGGREGATED STABILITY FACTORS

Important to the stability of any nation-state is a generalized social climate (Stonier) or socialized support (Tapper, Hughes and Grinter) for the political system. Stability factors that have been determined important to mass support and elite leaderships by various authors in the areas of political socialization and treaties and alliances are aggregated below.

Mass Support

1. Nationalism (Milnor): Includes Symbol Identification and heroes (Milnor), group values (Pirages), national self-image and value sharing (Rosen).
2. Citizen Involvement (Milnor): Includes electoral process (Milnor), the virtues of plurality versus those of proportionality (Nordlinger), politics (Grinter), political apathy (Pirages) and party loyalties (Tapper).
3. No Sharp Cleavages with Elite (Tapper and Nordlinger): Includes deification of leaders (Milnor), criterion of competence and acceptance of the use of force (Pirages).
4. Lack of Sharply Divisive Issues within the Mass (Pirages): Includes minimization of racial, ethnicity, religious, ideological and regional issues (Pirages), no irredentism and perception of mutual benefits (Rosen).
5. Outlets for Competition (Pirages): Includes a sound economic basis (Liska), sufficient space (land) and economic potential (Rosen) and increasing productivity (Stonier).
6. Personal Rewards and Advantages (Tapper): Includes citizen involvement (Milnor), satisfaction of economic and psychological needs (Pirages), political potential and social assimilation (Rosen).

TABLE VI (Continued)

Elite Leadership

1. Recruitment and socialization (Tapper): Provides avenue to leadership roles for the mass but primarily maintains elite. Includes history of transactions; peaceful, revolution or coup d'etat (Root).
 2. Personal Rewards and Advantages (Tapper): Includes citizen involvement (Milnor) and provides impetus to leadership for the elite (Tapper).
 3. Outlets for Competition (Pirages): Includes providing for and controlling the economic well-being of the nation-state (Pirages).
 4. Control/Stimulate Demands (Tapper): Includes the "sallience of power" (creating centralizing and institutionalizing power) (Grinter), depoliticization of, compromise of, and concessions on issues (Nordlinger), tying authority to religious beliefs in traditional societies, use of moral suasion, control of sociopolitical information and minimizing any perception of relative deprivation (Pirages).
 5. Maintain system (status-quo) or Persist (slow-change) (Tapper): Includes rules and sanctions for society and provides outlets in form of rule breaking overlooked if not caught, threats of force (sanctioned) and modification of individual beliefs to elite goals (Pirages); use of mutual veto in government by various elements of the society (Nordlinger); and focus on external hostile forces (Milnor and Rosen) to include war (Hughes).
-

Graduate School in January of 1981 and it used six factors to judge the masses and five factors to judge the leadership. Certain factors, 3 and 5 for the masses and 1 and 3 for the elite were considered essential for societal stability. The plan was that if they could be answered in the affirmative and over

50 percent of all other questions answered in the affirmative, then I would classify the government as stable for the analysis. If any of the key questions were negative or if less than 50 percent of the remaining questions were affirmative, then the government was to be listed as unstable.

Revision of the Stability Factor Model

Operationally, the use of two lists to arrive at one stability factor proved awkward. There were two common factors, outlets for competition, and personal rewards and advantages, in both lists, that had the same basis for determination. In reexamining the purpose of the model, to determine national stability, it became apparent that it would be nice to be able to separate the bases of mass support and elite leadership but not essential to the purpose of the analysis. Therefore, the decision was made to combine the factors in the two lists that were the same and to add the two lists together. The factors in the two-part Table VI were thus refined into the single list of factors in Table VII resulting in a model that lacked the awkwardness of its predecessor without sacrificing any elements of the analysis.

TABLE VII

MODEL FOR NATIONAL STABILITY DETERMINATION

Important to the stability of any nation-state is a generalized social climate (Stonier) or socialized support (Tapper, Hughes and Grinter) for the political system. Stability factors that have been determined important to mass support and elite leaderships by various authors in the areas of political socialization and treaties and alliances are aggregated below. Factors 3, 5 and 7 must be positive in a stable regime. If those key factors and over 50 percent of all factors can be answered affirmatively, the country will be adjudged stable under this model.

1. Sense of Nationalism or Nationhood (Milnor): Includes symbol identification and heroes (Milnor), group values (Pirages), national self-image and value sharing (Rosen).
2. Citizen Involvement in Government (Milnor): Includes electoral process (Milnor), the virtues of plurality versus those of proportionality (Nordlinger), politics (Grinter), political apathy (Pirages) and party loyalties (Tapper).
3. No Sharp Cleavages Between Mass and Elite (Tapper and Nordlinger): Includes deification of leaders (Milnor), criterion of competence and acceptance of the use of force (Pirages).
4. Lack of Sharply Divisive Issues within the Mass (Pirages): Includes minimization of racial, ethnicity, religious, ideological and regional issues (Pirages), no irredentism and perception of mutual benefits (Rosen).
5. Outlets for Competition (Pirages): Includes a sound economic basis (Liska), sufficient space (land) and economic potential (Rosen), increasing productivity (Stonier), and providing for and controlling the economic well-being of the nation-state (Pirages).
6. Personal Rewards and Advantages (Tapper): Includes citizen involvement (Milnor), satisfaction of economic and psychological needs (Pirages), political potential and social assimilation (Rosen) and provides impetus to leadership for the elite (Tapper).
7. Recruitment and Socialization (Tapper): Provides avenue to leadership roles for the mass but primarily maintains elite. Includes history of transactions;

TABLE VII (Continued)

peaceful, revolution or coup d'etat (Root).

8. Institutionalized Systems for Controlling/ Stimulating Demands (Tapper): Includes the "salience of power" (creating, centralizing and institutionalizing power) (Grinter), depoliticization of, compromise of, and concessions on issues (Nordlinger), tying authority to religious beliefs in traditional societies, use of moral suasion, control of sociopolitical information and minimizing any perception of relative deprivation (Pirages).

9. Methods for System Maintenance (status-quo) and/or Persistence (slow-change) (Tapper): Includes rules and sanctions for society and provides outlets in form of rule breaking overlooked if not caught, threats of force (sanctioned) and modification of individual beliefs to elite goals (Pirages); use of mutual veto in government by various elements of the society (Nordlinger); and focus on external hostile forces (Milnor and Rosen) to include war (Hughes).

Under the revised model contained in Table VII, factors 3, 5 and 7 were considered essential for societal stability. If they were answered in the affirmative and over 50 percent (at least five) of all questions were answered in the affirmative, then I classified the society as stable for the analysis. If less than 50 percent of the questions were affirmative, or if any of the essential questions were negative then the society was listed as unstable. It is acknowledged that this method permitted some subjectivity in the classification, but it also provided a point of departure where none existed before. It is hoped that the model will provide the impetus for

other researchers to either confirm this schema or develop some other, objective means of determining stability.

After the stability factor for each nation was determined using the model in Table VII, that factor was then used as an input into the model for distinguishing characteristics of offset agreements that were implemented from those that were not implemented. The procedure was to see if the 16 variables selected out of the 17 originally isolated could be used to distinguish characteristics of the offset agreements that were implemented from those that were not at a statistically significant level.

Choice of Technique - Discriminant Analysis

The initial inclination was to postulate that a predictive model could be developed to give a statistical probability of certainty in assigning offset proposals to categories of probable success or non-success. The initial inclination also included using regression analysis as the technique for analysis of the data. After the research began and the available data was examined all of the initial inclinations had to be discarded.

The first part of the inclination to be discarded was the thought of developing a predictive

model. The body of data available was sparse in a relatively new field of endeavor and the various variables that might be important to the process of offsets had not been described. The process of developing a descriptive model became a paramount objective.

The second part of the inclination to be discarded was the thought of assigning offset proposals to categories of probable success or non-success. The concept of success sounded positive and desirable but defied objective description. Success from whose perspective? What degree of success had been obtained? Was success to be equated with implementation or could a project be successful and still fall short of implementation of coproduction? When these questions were squarely faced, it became obvious that a more realistic objective would be to assign offset proposals to categories of implementation or non-implementation.

The third part of the inclination to take flight under careful scrutiny was the use of regression analysis as the technique for analysis of the data. As noted in Table III, the factors that affect cooperation among or between nations can be analyzed as political, economic or national security factors. However, there were three drawbacks to using the data in this manner with regression analysis. The first draw-

back was that while the economic factors could be analyzed quantitatively, the political and national security factors were qualitative. Had that been the only problem then the analysis could have used an analysis of covariance. But the second problem was extensive factor interaction. Few of the factors were purely economic, or political, or national security factors. The confounded economic factors thus became qualitative factors when considered from the perspective of "how" they interacted with other variables in describing an offset proposal. The third drawback was there was no quantitative result or level of "success" that could be used to show the effectiveness of the factors in achieving some level of performance. There was no "causal" effect to be analyzed.

The result of the above was that we were left with two groups of data for offset proposals that had either been implemented or non-implemented. As William Klecka said, "Discriminant analysis begins with the desire to statistically distinguish between two or more groups of cases. These 'groups' are defined by the particular research situation."⁷² After extensive discussions with the dissertation committee chairman, Dr. Laurence Madeo, it was determined to

⁷²William R. Klecka, "Discriminant Analysis" in Norman W. Nie, et al., eds., Statistical Package for the Social Sciences, 2d ed. (New York: McGraw-Hill Book Company, 1970), p. 435.

use step-wise discriminant analysis of the form

$$D = d_1z_1 + d_2z_2 + \dots + d_pz_p$$

where D = Score on discriminant function

d_p = weighting coefficients, and

z_p = standardized values of the
discriminating variables

Since this analysis only includes past offset proposals that were either implemented or non-implemented, it will represent an initial analysis to be used by other analysts for comparing offset proposals rendered after 31 December 1978.

Data Used in the Research

The data used in this research were initially extracted from case studies contained in the literature search. The dissertation copies on the related studies were obtained from University Microfilm International. The master's theses and independent research reports were obtained from the Defense Logistics Studies Information Exchange which was located at the U.S. Army Logistics Management Center at Fort Lee, Virginia. They were made available on microfiche. These materials provided information on the 50 cases upon which the proposal for this dissertation was

built. Additional cases were obtained through library research in the Department of State Bulletin, Treaties and Other International Agreements of the United States, and various trade journals such as Aviation Week and Space Technology and Jane's publications. Further research was conducted through personal contact with the Office of the Secretary of Defense for International Security Policy and the Under Secretary of State for Security Assistance.

Objectives of the Research

The overall objective of this research was to provide a mathematical model to be used to objectively categorize offset proposals from a spectrum of potential actions within long range foreign policy goals.

The hypothesis of interest in this study was: Political preferences, economic factors and national security considerations can be combined into a mathematical model for offset analysis. In arriving at the hypothesis this research effort involved study of the following data:

- (1) The outcome (implemented or non-implemented) of previous cooperative research and development and coordinated production agreements in the international arms sale market.

- (2) The relationship of various market factors such as gross national product and balance of payments to outcomes of previous cooperative research and coordinated production agreements in the international arms market.
- (3) The political aspects of environment that affect offsets in arms sales such as treaty obligations, governmental stability and the aspirations of lesser developed countries (LDCs) that the U.S. government wishes to keep in its sphere of influence.
- (4) The national security aspects of environment that must be considered in international arms sales such as strategic and tactical readiness impacts and protection of technological advantage.

In testing the hypothesis the research attempted to answer the following related questions:

- (1) Can a mathematical model be developed that would have described the likelihood for success of past offset proposals within national policy guidelines?
- (2) Can the model developed in (1) of this study be utilized as a tool in the evaluation of future offset proposals?

The conclusions of the test will be related in Chapter Five.

Data Systems Used in the Study

The analysis for the model was run by the United States Air Force on a Honeywell 60-68 computer using the SPSS: Statistical Package for the Social Sciences program. It employed the Discriminant Analysis procedure using the Rao's V method of analysis.

Chapter Four

MODELS, DATA AND ANALYSIS

This chapter discusses the utilization of the two models developed in this research. First to be discussed is the determination of the variables that were selected as potential discriminants between off-set proposals that were implemented and those that were not. This discussion carries through labelling the variables, how those variables were entered into the statistical procedure, and the intuitive importance of those variables as I expected to see them in the experimental results. Then the discussion stops and takes a step backward to examine the model for determining national stability. It will show examples of how stability was determined for two countries and then entered into the primary model of this research. The discussion will then proceed to the testing of the data; the stepwise discrimination with Rao's V and an examination of the plots of discriminant scores. The data sheets prepared for the two models and the control file program used in the analysis are contained in the Appendices. Discussion of the conclusions drawn from the analysis is reserved until Chapter Five.

Selecting the Discriminating Variables

The examination of the factors that were determined important to the implementation or non-implementation of specific cases of codevelopment or coproduction was portrayed in Chapter Three. Those factors were then aggregated into seventeen variables for consideration in the model for evaluation of offset proposals in international arms transfers. One of the seventeen variables, expropriation by the host nation, was dropped from consideration in this type of international business venture. This was because sponsorship of the venture by the host government at the Ministry of Defense/Department of Defense level is necessary so that expropriation would be of a home industry. Discussion of the determination of the remaining sixteen variables follows.

The determination of stability of the recipient countries was based upon the model previously described for the year in which the offset proposal was made.

The determination of importance to national prestige came from comments in the trade journals combined with considerations for home industries.

The determination of offset proposal supports government policy was determined by officially stated

policy at the time of proposal.

Determination of considerations for employment were taken from the proposals and in some instances from data available from the Department of Commerce on world trade.

Determination of concern for development of home industry was deduced from articles in the trade journals. Countries like France and the United Kingdom had developed home industries in some instances but were interested in protecting the production and employment bases.

Determination of formal commitment to buy was extracted from two sources. Those proposals that were initiated but not carried through to implementation were examined to see if the governments concerned had committed themselves to buy the final product, but then terminated the agreement for some other reason. If there had been a formal commitment, it was recorded in the affirmative, otherwise they were classified as without commitment. Implemented proposals were recorded in the affirmative.

Determination of provider willing to share technology was somewhat difficult. If the agreement showed the provider seeking the business it was recorded as affirmative. If the government had to use sweeteners or coercion, it was recorded as

negative. Otherwise the data was recorded as not available.

Determination of formal alliances in existence was based on Treaties in Force,¹ Treaties and Alliances of the World² and policy statements on legislation.

Determination of balance of payments concerns came from official policy, trade journals, trade stipulations monitored by the Department of Commerce and the readings in the research.

Economies of Scale was determined by obtaining published statements on the need or desire for broader production of a weapon system where it was available.

Determination of GNP per capita above the level of the Lesser Developed Countries (LDC's) was based on the definition of the Industrially Developed Countries by the International Bank for Reconstruction and Development.

Determination of ability to share in technology was based on Department of State determinations,

¹U.S. Dept. of State, Treaties in Force: A List of Treaties and Other International Agreements of the United States in Force on January 1, 1980, Department of State Publication 9136. [Treaty Affairs Staff, Office of the Legal Advisor], [Washington, D.C.: Government Printing Office, 1980].

²Treaties and Alliances of the World, U.S. edition (New York: Charles Scribner's Sons, 1974).

information in the trade journals and agreements executed in the offset agreements.

Determination of recipient's ability to meet financial obligations under the agreement was difficult to ascertain. One approach would have been to base the determination on GNP per capita, but that would have duplicated the data already documented in GNP per capita above the level of the LDC's since that was the natural break point for ability to buy. The acceptance of a sale agreement rather than grant aid by the Department of State was finally used as the determinant for this factor.

Determination of lack of agreement in relevant national standards was based on differences between the yard or meter and differences in standards for sheet metal, threads, wire, etc.

Determination of impact on readiness to participate in armed conflict was based on delayed delivery dates, program slowdowns and/or program terminations.

The above data were then entered into the statistical procedure to see if the 16 variables selected out of the 17 originally isolated could be used to distinguish characteristics of the offset agreements that were implemented from those that were not at a statistically significant level. Step-

wise discriminant analysis was used to select the best set of discriminating variables. Two groups were analyzed, implemented and non-implemented.

The variables were scored +1 for a yes answer, -1 for a no answer and 0 for no data or undeterminable for a variable. The basic definitions employed for variables were as follows:

- X01 = Internal stability of recipient country
- X02 = Important to National Prestige - Recip
- X03 = Offset agreement supports government policy - Both
- X04 = Both governments seeking to expand employment base
- X05 = Recip development of home industry
- X06 = Formal commitment for development/production - Both
- X07 = Prov willing to share technology
- X08 = Formal alliance in existence - Both
- X09 = Prov Overflight/Access rights
- X10 = Balance of Payments Concerns - Both
- X11 = Economies of Scale - Both
- X13 = GNP per capita above LDC - Recip
- X14 = Ability to share in technology - Recip
- X15 = Recip ability to meet financial obligation under agreement
- X16 = Lack of agreement in relevant National

Standards - Both

X17 = Impacts readiness to participate in
armed conflict - Both

X18 = Proposal Implementation Status

For variable X13, LDC is a non-industrially developed country as defined by the International Bank for Reconstruction and Development.

As stated above and discussed in Chapter Three, two groups were analyzed, implemented, composed of 157 cases, and nonimplemented, composed of 34 cases. (See Table VIII.) The discriminant function was of the form

$$D = d_1z_1 + d_2z_2 + \dots + d_pz_p^3$$

Where D = Score on the discriminant function,

d_p = weighting coefficients, and

z_p = standardized values of the
discriminating variables.

Before the statistical procedure was run an intuitive rank ordering of the variables was formulated for use as a guideline in comparing anticipated results with the actual findings. The projection also anticipated whether a variable was expected to lead to

³Klecka, William R., "Discriminant Analysis," in Norman H. Nie, et al., SPSS: Statistical Package for the Social Sciences (New York: McGraw-Hill Book Company, 1975), pp. 434-467.

implementation or non-implementation. The rank ordering closely approximated the variables categorized by essentiality as contained in Table IV B although certain variables with supposed marginal value to governments were interspersed with those considered essential for implementation.

Internal stability of the recipient country was expected to be the most important variable for implementation of an offset agreement. It was anticipated that despite any other reason (i.e., readiness, prestige, economies of scale) weapon system codevelopment and coproduction would not be risked with a nation that was not stable.

Important to national prestige of the recipient was anticipated to be the second most important variable for implementation. It was thought that governments that needed a "prestige" weapon system to show some economic progress to their populace would insist on selected coproduction projects.

The third most important variable from an intuitive standpoint was expected to be when the offset agreements supported government policy. This pre-supposed a logical assumption of governmental consistency between official policy and activities.

The requirements for both governments to expand the employment base and for the recipient to

AD-A121 567

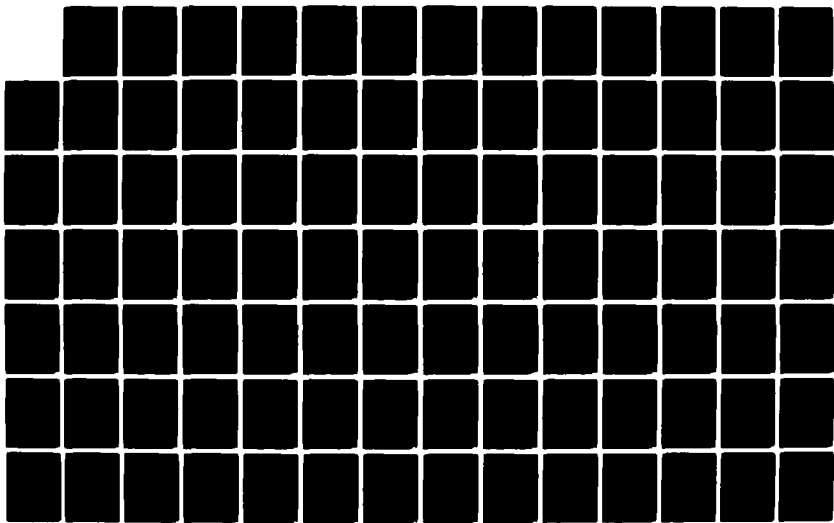
A MODEL FOR THE EVALUATION OF OFFSETS IN INTERNATIONAL
ARMS TRANSFERS(U) SAINT LOUIS UNIV MO H L BAILEY 1982

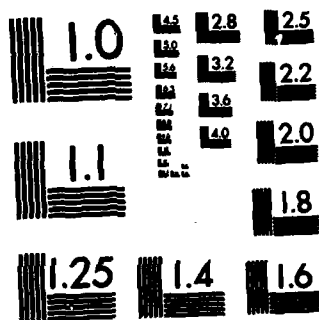
3/4

UNCLASSIFIED

F/G 15/5

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

develop home industry were anticipated to be the fourth and fifth variables supporting implementation of an offset agreement.

The sixth most important variable, readiness to participate in armed conflict, was expected to enhance implementation. So, also, were formal commitment for development/production, willingness of provider to share technology, existence of formal alliances, concerns for balance of payments, economies of scale, GNP per capita more than LDC, ability of recipient nation to share in technology, and ability of recipient to meet financial obligations.

Lack of agreement in relevant national standards was expected to contribute to non-implementation of offset agreements. Provision for overflight access rights was anticipated to be of limited importance due to the variable concerning formal alliances.

Determining National Stability

Examination of the factors that contribute to national stability or instability and the development of the model for determining national stability were discussed in Chapter Three. In applying the model it was necessary to first develop an Index of Revolution, Coup d'Etat or Social Unrest (Appendix G) for all of

Table VIII

List of Codevelopment and Coproduction
Projects Between 1952 and 31 December
1978 With U.S. DOD Involvement

Project/Year	Countries	Implemented (Y/N)
<u>Aircraft</u>		
1. T-34 Trainer, 1953	Japan	Y
2. CS2F-1 Anti-Submarine, 1954	Canada	Y
3. F-86F, 1955	Japan	Y
4. C-119 Transport, 1955	Italy	Y
5. T-33 Trainer, 1955	Japan	Y
6. L-19 Observation, 1956	Japan	Y
7. P2V-7 Patrol	Japan	Y
8. T-34 Trainer, 1959	Argentina	Y
9. C-52F Anti-Submarine, 1959	Canada	Y
10. F-104J, 1959	Japan	Y
11-14. F-104G, 1959	Belgium, Italy, FRG, Netherlands	Y
15. CF-104, 1960	Canada	Y
16. P-1127 VTOL (Kestrel), 1960	U.K.	Y
17. CV-7A Buffalo, 1962	Canada*	Y
18. Cessna 182 Observation, 1965	Argentina	Y
19. CF-5 Fighter, 1965	Canada	Y
20. F-104S, 1965	Italy	Y
21. F-5, 1965	Spain	Y
22. F-4, 1965	U.K.	Y
23. NF-5 Fighter, 1967	Netherlands	Y
24. RF-4, 1968	F.R.G.	Y
25. F-4 parts, 1969	Japan	Y
26. Harrier VSTOL Fighter, 1969	U.K.*	Y
27. F-4F, 1971	F.R.G.	Y
28. F-5E/F, 1972	Taiwan	Y
29-32. F-16, 1975	Belgium, Denmark, Netherlands, Norway	Y
33. F-5E/F, 1975	Switzerland	Y
34. F-4J, 1977	Japan	Y
35. F-15J, 1978	Japan	Y
36. P3C Patrol, 1978	Japan	Y
37. CT-20 Drone, 1958	France*	N

Table VIII (Continued)

Project/Year	Countries	Implemented (Y/N)
38-41. Atlantique Maritime Patrol, 1958	France,* F.R.G., Netherlands, Belgium	N
42. CT-41 Drone, 1960	France*	N
43. VSTOL Fighter R&D, 1960	F.R.G.*	N
44. Mirage III-V, 1963	France*	N
45. Breguet 941 STOL Transport, 1965	France*	N
46. C-130 Transport, 1965	U.K.	N
47. F-15, 1966	Canada	N
48-49. C-5 Transport, 1966	Canada, U.K.	N
50-51. F-111, 1966	Canada, U.K.	N
<u>Helicopters</u>		
52. Bell 47, 1952	Italy	Y
53. Bell 47, 1953	Japan	Y
54. Sikorsky S-51, 1956	U.K.	Y
55. S-55, 1956	U.K.	Y
56. S-58, 1956	U.K.	Y
57. Alouette II, 1958	France*	Y
58. S-55, 1958	Japan	Y
59. S-54, 1959	FRG	Y
60. S-58, 1959	FRG	Y
61. S-61/SH-30, 1959	U.K.	Y
62. S-58, 1960	France	Y
63. S-62, 1960	India	Y
64. Bell 204, 1960	Italy	Y
65. Bell 204, 1960	Japan	Y
66. Boeing-Vertol 107, 1960	Japan	Y
67. S-61, 1960	Japan	Y
68. S-62, 1960	Japan	Y
69. Bell 205, 1963	Italy	Y
70. Bell UH-1D, 1965	FRG	Y
71. CH-53, 1968	FRG	Y
72. CH-47C, 1968	Italy	Y
73. CH-53, 1968	Canada	Y
74. Bell 212, 1969	Italy	Y
75. Hughes 369, 1969	Italy	Y
76. Bell 6H-1D, 1969	Taiwan	Y
77. Agusta A-101, 1959	Italy*	N

Table VIII (Continued)

Project/Year	Countries	Implemented (Y/N)
<u>Tanks and Self-Propelled Weapons</u>		
78-79. M-72 LAW Anti-Tank, 1964	Canada, Norway	Y
80. M-60-A1 Tank, 1964	Italy	Y
81-82. 109 MM Howitzer, 1966	Netherlands, Norway	Y
83. 109 MM Howitzer, 1968	Italy	Y
84. M-47 Tank Retrofit, 1970	Iran	Y
85. MBT-70, 1963	FRG	N
<u>Vehicles</u>		
86. M-113 (APC), 1963	Italy	Y
87. HET-70, 1965	FRG	Y
88. General Purpose, 1966	Taiwan	Y
89-92. ERMIS, 1975	France, FRG, Netherlands, U.K.	Y
93. XM-571, Year Uncertain	Canada	N
<u>Infantry Weapons and Ammunition</u>		
94. Rocket Launcher, 1963	Belgium	Y
95. Handheld Weapons, 1967	Taiwan	Y
96. M-16 Rifle, 1971	Korea	Y
97. Ammunitions, 1972	Korea	Y
98. 2.75 FFR Rockets, 1972	Turkey	Y
99. M-16 Rifle, 1974	Philippines	Y
<u>Missiles</u>		
100-104. AIM-7 Sparrow, 1959	Belgium, Canada, FRG, Italy, Netherlands	Y
105-109. Hawk, 1960	Belgium, FRG, France, Italy, Netherlands	Y

Table VIII (Continued)

Project/Year	Countries	Implemented (Y/N)
110. Polaris, 1960	U.K.	Y
111-114. Bullpup, 1962	Denmark, Norway, Turkey, U.K.	Y
115. Hawk, 1967	Japan	Y
116. Nike Hercules, 1967	Japan	Y
117-122. Improved Hawk, 1968	Belgium, Denmark, France, Greece, Italy, Netherlands	Y
123-129. AIM-9 Sidewinder, 1968	Belgium, FRG, Greece, Netherlands, Norway, Portugal, Turkey	Y
130-135. Sea Sparrow, 1968	Belgium, Denmark, FRG, Italy, Netherlands, Norway	Y
136. AIM-9 Sidewinder, 1974	Italy	Y
137-138. Roland, 1975	France,* FRG*	Y
139. AIM-7 Sparrow, 1977	Japan	Y
140. Improved Hawk, 1977	Japan	Y
141-146. Improved Sea Sparrow, 1977	Belgium, Denmark, FRG, Italy, Netherlands, Norway	Y
147. Copperhead, 1977	U.K.	Y
148. Harpoon, 1977	U.K.	Y
149-152. AIM-9L Side- winder, 1978	FRG, Italy, Norway, U.K.	Y
153. Skybolt, 1959	U.K.	N
<u>Ships</u>		
154. Frigate, 1960	Norway	Y
155. Destroyer Escort Group, 1964	Spain	Y
156. Swordfish Patrol, 1965	Italy	Y
157. Guided Missile Frigate, 1975	Norway	Y
158-159. Fast Patrol, Hydrofoil, 1973	FRG, Italy	N

Table VIII (Continued)

Project/Year	Countries	Implemented (Y/N)
Miscellaneous Systems		
160. TF-30 Jet Engine, 1950	France	Y
161-163. MK-44 Torpedo, 1950s	Canada, France, Italy	Y
164. J-79 Jet Engine, 1960	Canada	Y
165. L-102 Autopilot, 1960	France	Y
166. Air Defense Command and Control System, 1967	Japan	Y
167. Beryllium in Engines R&D, 1960s	U.K.	Y
168. Advanced Flight Control Technology R&D, 1972	FRG	Y
169. Cartography Technology R&D, 1972	FRG	Y
170. Remotely Piloted Vehicles R&D, 1972	FRG	Y
171. AN/PRC-77 Radio, 1973	Korea	Y
172. ARGUS-10 Radar, 1974	Italy	Y
173. SLAR (UPD-X), 1975 (Side Looking Airborne Radar)	FRG	Y
174. Modular Thermal Imaging Systems (MOD FLIR), 1978	FRG	Y
175,177. Multiple Launch Rocket System (MLRS), 1978	France, U.K., FRG	Y
178. Air Cushion Landing System, 1970s	Canada	Y
179-188. General Codevelop- ment, Coproduction, Cologistics Agreement, 1960	Australia, Belgium, Denmark, France, FRG, Italy, Netherlands, Norway, Portugal, Turkey	N
189. General Codevelopment, Coproduction Agree- ment, 1970	Argentina	N

Table VIII (Continued)

Project/Year	Countries	Implemented (Y/N)
190-191. General Codevelopment, Coproduction, Cologistics Agreement, 1978	FRG, Norway	N

Note: *indicates system developed in country marked.

Sources: The above mentioned cases of codevelopment or coproduction were extracted during the literature search from various studies, journals and research works listed in the bibliography.

the countries with which the United States had considered codevelopment or coproduction projects during the period of the research. That research was then used to supply data for the model. One of the advantages to this approach was that the documented history of the period revealed the dynamic quality of the factors chosen to determine national stability. This allowed adjustments in those factors to be determined on a yearly basis (my choice; longer or shorter periods can be used). The factors were then classified as either existing, indeterminable or non-existent for the year that the offset proposal was rendered.

The determination of a sense of nationalism or nationhood was determined by looking at the scale and scope of social unrest. If social movements were trying only to cause a change in government the factor was classified as existent. In those countries where the goal of social movements was the fragmentation of the existing nation along group lines the scale of the movement was used in making the determination. A few terrorists were not enough to threaten nationhood but terrorists with widespread appeal and support among the dissident groups were sufficient to list this factor as nonexistent. A critical exclusion in this criterion were external groups who indulged in terrorism to attract attention to another country.

Citizen involvement in government was heavily dependent upon two requirements. Citizens from both the mass and the elite had to be able to participate in the electoral process for determining or validating government. Avenues had to exist for members of the mass and elite to strive for leadership roles. The questions of whether the system was democratic or totalitarian or whether it had a proportional or plurality system then became unimportant to this model.

No sharp cleavages between mass and elite was determined by an absence of instances of revolution,

coup d'etat or social unrest.

Lack of sharply divisive issues within the mass required an absence of social unrest based on group lines.

Outlets for competition was determined by a lack of issues within the mass based upon deprivation of competition in the marketplace. If divisive issues existed within the mass then the source materials were examined to see if overt or covert mechanisms existed to prevent minority groups from competing. If competition was attainable by any member of the mass then it was classified as existent.

Personal rewards and advantages was determined by whether or not the mass aspired to leadership within the system or whether there was a social movement to change the government. Again scale was important. Widespread support for an overthrow of the current regime caused this criterion to be classified non-existent.

Recruitment and socialization was the availability within the society of opportunities for advancement to leadership roles for both mass and elite.

Institutionalized systems for controlling/ stimulating demands was determined by the lack of widespread or widely accepted dissident organs of communication (i.e., radio stations, newspapers,

sloganeering). The existence of clandestine, underground communications channels opposed to the incumbent elite and controlled by dissident members of the society (internal) would classify this criterion as non-existent.

Methods for system maintenance and/or persistence was determined by the ability of the society to quell dissident social unrest. The methods could range from consensus to coercion. Moral judgments were not made as to the efficacy of a system. If methods existed they were classified as existent.

The above factors were then manually entered into the model and a determination of national stability was made and entered into the offset model. Examples of a stable and an unstable government are given below.

In 1965 Spain requested a coproduction agreement on the F-5 aircraft. At that time Spain was controlled by the dictator Francisco Franco and there was some repression of political rights. Yet, there was no overt sign of social unrest. The Spanish had a sense of nationalism, could be involved in government if they joined Franco's party, and held Franco in awe, if not reverence. At the same time Spanish society had indeterminate cleavages within the mass but hid the divisive issues that surfaced in later years. The Spanish people worked toward developing a middle class,

allowed advancement within the dominant political party to real and responsible roles of leadership, and had strong controls over the populace embodied in the Army and the Guardia Civil. They, also, had the support of the Catholic Church for the government among the traditionally conservative hierarchy. In terms of the model for national stability all of the factors were definitely existent with the exception of no sharp cleavages between mass and elite and lack of sharply divisive issues within the mass. Those two factors were indeterminate rather than nonexistent so Spain was classified as a stable country.

In 1959 Argentina sought a coproduction agreement with the United States to produce the Beech T-34 pilot trainer aircraft. Argentina had a definite sense of nationhood. Elements within the society sought to change the faces in charge of government, but not the form of government. Citizens were involved in government in that they could belong to various political parties that were out of power or they were able to join and support the military controlled government. Avenues were available to seek leadership roles and bright members of the mass were recruited to fill them. There were outlets for competition and development of business was encouraged. Personal awards and advantages were available to the mass even

though the society tended to favor the elite. However, there were deep and divisive cleavages between the mass and elite over economic conditions and how the economy should be controlled. These cleavages produced the aforementioned elements that sought to change the faces in charge of government and violence within the society was not uncommon. There was, also, an ideological rift within the mass concerning the demands of trade unions as compared with the traditional society. The military junta that controlled the government tried to quell dissident unrest but they were effectively opposed by the trade unions and the Peronistas. Both clandestine and openly opposed communications in the form of radio broadcasts, newspapers and slogans attacked the policies and military leaders of the government. In terms of the model for national stability the factors of no sharp cleavages between mass and elite, lack of sharply divisive issues within the mass, institutionalized systems for controlling/stimulating demands, and methods for system maintenance and/or persistence were nonexistent. The remaining factors were existent. As a result, with the factor no sharp cleavages between mass and elite being nonexistent, Argentina, in 1959, was classified as unstable according to the model for national stability.

Testing the Data

The data used in this research were developed from codevelopment and coproduction proposals extracted from library research of dissertations, master's theses, research reports, agreements listed in the Department of State Bulletin or Treaties and Other International Agreements of the United States, Aviation Week and Space Technology and the various Jane's publications (e.g., Jane's All The World's Aircraft). Data was also obtained through interviews granted by Mr. Mark Easton, Office of Security Assistance and Sales, Department of State and Mr. Frank Cevasco, Office of International Security Policy, Department of Defense.

The data analyzed in this research involved 124 cases of offset proposals which involved 191 separate country agreements. Since there was no conventional way to combine the data for each country in a case, the decision was made to treat each country as a separate case. Thus the analysis was conducted with 191 cases as the input data.

Subprogram Discriminant of the Statistical Package for the Social Sciences (SPSS) was used to test the data. The Rao's V method was employed for a stepwise discriminant analysis. The program was run twice initially. The first run eliminated all cases with one or more missing variable values (72) and used

the remaining 119 cases in the analysis. The second run retained all 191 cases in the analysis. The two runs were compared to see what impact eliminating those cases with missing variable values had on the analysis. Those comparisons follow. Later the analysis was run again retaining all 191 cases but suppressing variable X16.

Stepwise Discrimination With Rao's V

The statistics requested in both analyses were means, standard deviations, pooled within groups covariance matrix, pooled within groups correlation matrix and the matrix of pairwise F ratios. Only those statistics that supplied data important in the results will be further discussed.

The options requested were as follows:

- 1) A classification results table indicating for each group the number of cases classified into each of the groups and the percent correct classifications for the known groups.
- 2) A printout of unstandardized discriminant function coefficients and the constant to be used in computing discriminant scores from raw data.
- 3) A printout of standardized discriminant function coefficients.
- 4) A printout of the classification function coefficients for use with raw data in producing

classification scores.

5) A histogram plot of the distribution of cases along the discriminant function.

Means and Standard Deviations. An examination of the means and standard deviations of the analysis excluding cases with missing values showed that variables X03, Offsets Support Government Policy, X14, Able to Receive Technology and X15, Able to Pay had Standard Deviations of zero and means respectively of -1.0, 1.0 and 1.0. This indicated that these variables would not be useful for discrimination in the analysis. When all of the missing value cases were included in the analysis, however, the mean and standard deviation of both variable X14 and variable X15 indicated some differentiation in those variables and they entered into the analysis for discriminating variables. Variable X03, Offsets Support Government Policy, maintained a mean of -1.00 and a standard deviation of zero and was not to be of use in this discriminant analysis. (See Tables IX and X.)

Matrix of Pairwise F Ratios. The design with two groups limited the outcome of the analysis to one discriminant function resulting from stepwise discriminant analysis. Following each step in the analysis a matrix of pairwise F ratios between the implemented and nonimplemented groups was prepared.

Table IX

Means

<u>Group I</u>	X01	X02	X03	X04	X05	X06
MV	0.593	0.148	-1.000	0.852	0.315	1.000
A	0.514	0.217	-1.000	0.898	0.395	1.000
<u>Group I</u>	X07	X08	X09	X10	X11	X13
MV	0.981	0.981	0.704	0.056	0.778	0.685
A	0.930	0.987	0.694	-0.038	0.631	0.369
<u>Group I</u>		X14	X15	X16	X17	
MV		1.000	1.000	0.944	0.519	
A		0.930	0.828	0.924	0.420	
<u>Group II</u>	X01	X02	X03	X04	X05	X06
MV	-0.091	0.273	-1.000	0.455	-0.273	0.273
A	0.353	-0.118	-1.000	-0.029	-0.471	-0.471
<u>Group II</u>	X07	X08	X09	X10	X11	X13
MV	1.000	1.000	0.091	-0.636	0.818	1.000
A	0.618	1.000	0.353	-0.676	0.500	0.706
<u>Group II</u>		X14	X15	X16	X17	
MV		1.000	1.000	1.000	0.455	
A		0.588	0.500	1.000	0.206	
<u>Total</u>	X01	X02	X03	X04	X05	X06
MV	0.529	0.160	-1.000	0.815	0.261	0.933
A	0.508	0.157	-1.000	0.733	0.241	0.738
<u>Total</u>	X07	X08	X09	X10	X11	X13
MV	0.983	0.983	0.647	-0.008	0.782	0.714
A	0.874	0.990	0.634	-0.152	0.607	0.429
<u>Total</u>		X14	X15	X16	X17	X18
MV		1.000	1.000	0.950	0.513	
A		0.869	0.770	0.937	0.382	

NOTE: MV = Missing Values Excluded Analysis;
A = Total Cases Analysis

Table X

Standard Deviations

<u>Group I</u>	X01	X02	X03	X04	X05	X06
MV	0.809	0.994	0.000	0.526	0.954	0.000
A	0.805	0.970	0.000	0.441	0.911	0.000
<u>Group I</u>	X07	X08	X09	X10	X11	X13
MV	0.192	0.192	0.714	1.003	0.631	0.732
A	0.280	0.160	0.722	0.999	0.719	0.929
<u>Group I</u>		X14	X15	X16	X17	
MV		0.000	0.000	0.330	0.859	
A		0.256	0.379	0.385	0.878	
<u>Group II</u>	X01	X02	X03	X04	X05	X06
MV	1.044	1.009	0.000	0.934	1.009	1.009
A	0.917	0.946	0.000	1.000	0.896	0.896
<u>Group II</u>	X07	X08	X09	X10	X11	X13
MV	0.000	0.000	1.044	0.809	0.603	0.000
A	0.493	0.000	0.950	0.727	0.564	0.719
<u>Group II</u>		X14	X15	X16	X17	
MV		0.000	0.000	0.000	0.934	
A		0.500	0.564	0.000	0.641	
<u>Total</u>	X01	X02	X03	X04	X05	X06
MV	0.852	0.991	0.000	0.582	0.970	0.362
A	0.826	0.971	0.000	0.678	0.965	0.676
<u>Total</u>	X07	X08	X09	X10	X11	X13
MV	0.183	0.183	0.766	1.004	0.627	0.703
A	0.348	0.145	0.776	0.986	0.694	0.903
<u>Total</u>		X14	X15	X16	X17	
MV		0.000	0.000	0.315	0.862	
A		0.338	0.434	0.350	0.843	

NOTE: MV = Missing Values Excluded Analysis;
A = Total Cases Analysis

Table XI contains the F ratio for each step showing number of variables included and degrees of freedom. The table contains the F ratios for both the analysis with cases with missing values excluded and the total case analysis. At each step in both analyses the F ratios were significant at the .999 level of confidence.

Summary of the Stepwise Discrimination. The analysis of the data where the cases with missing values were removed resulted in six variables being selected as significant discriminators between implemented and nonimplemented cases (Table XII). They were, in order of selection Commitment for Development/Production, Expansion of the Employment Base, Important to National Prestige, Development of Home Industry, Concern for the Impact of Balance of Payments and GNP per capita larger than that of a Lesser Developed Country (LDC).

Although the summary table shows a very significant Wilks' Lambda this statistic is not appropriate for use as the data in this research were not randomly selected. The Rao's V, however, is a useable and a significant statistic. With the six variables selected as discriminators there were zero chances in 10,000 that the variables selected occurred due to chance. The significance of the

Table XI
F Ratios Between Groups During
Stepwise Discrimination

Variables Included	Degrees of Freedom		F (MV)	F _A
(X06) X06	1	(117) 189	60.677	431.54
(X04) X04	2	(116) 188	32.785	219.84
(X02) X02	3	(115) 187	23.057	150.37
(X05) X10	4	(114) 186	17.961	114.25
(X10) X13	5	(113) 185	15.139	93.352
(X13) X05	6	(112) 184	12.842	78.603
X07	7	(-) 183	--	68.101
X17	8	(-) 182	--	59.864
X13	7	(-) 183	--	68.313
X16	8	(-) 182	--	60.148

NOTE: Computation of the analysis with missing variables deleted (MV) ceased after Step 6 (six variables included).

change in V for each of the variables is also impressive with the exception of the variable GNP per capita larger than that of an LDC. The significance of the change in V due to that variable shows a probability of 1,454 out of 10,000 that the selection may be due to chance. When the total case analysis was run this variable was first selected and then, later, excluded from the list of discriminating variables.

The canonical correlation, which is a measure of association between the single discriminant function and the set of variables which define the group memberships was 0.6384136. This factor indicates that the discriminating variables while significant should, desirably, be more closely correlated for reliable classification of potential cases for offsets.

The analysis of the data containing all of the cases resulted in eight variables being selected as significant discriminators between the implemented and nonimplemented cases (Table XII). They were in order of selection Commitment for Development/Production, Expansion of the Employment Base, Important to National Prestige, Concern for the Impact of Balance of Payments, Development of Home Industry, Willingness to Share Technology, Readiness to Participate in Armed Conflict and Lack of Agreement in Relevant National

Table XIII
Discriminant Analysis Summary Tables
Analysis With Missing Value Cases Removed

Action	Wilks' Lambda	Sig	Rao's V	Sig	Change In V	Sig
1. X06	0.658498	-0.00	60.68	0.00	60.7	0.0000
2. X04	0.638874	-0.00	66.13	0.00	5.5	0.0195
3. X02	0.634418	-0.00	70.37	0.00	4.2	0.0395
4. X05	0.613418	-0.00	73.73	0.00	3.4	0.0668
5. X10	0.598858	-0.00	78.37	0.00	4.6	0.0313
6. X13	0.592428	-0.00	80.49	0.00	2.1	0.1454
<u>Analysis With All Cases Processed</u>						
1. X06	0.304571	0.00	431.5	0.00	431.5	0.0000
2. X04	0.299514	0.00	442.0	0.00	16.5	0.0012
3. X02	0.293050	0.00	455.9	0.00	13.9	0.0002
4. X10	0.289272	0.00	464.4	0.00	8.4	0.0037
5. X13	0.283846	0.00	476.9	0.00	12.5	0.0004
6. X05	0.280651	0.00	484.4	0.00	7.6	0.0049
7. X07	0.277396	0.00	492.3	0.00	7.9	0.0254
8. X17	0.275377	0.00	497.3	0.00	5.0	0.0254
9. (X13)	0.276772	0.00	493.9	0.00	-	0.0629
10. X16	0.274435	0.00	499.7	0.00	5.8	0.0159

NOTE: (n) indicates variable removed from the analysis

Standards. GNP per capita larger than that of an LDC entered the computation at Step 5 but was eliminated at Step 9.

The eight variables selected through the Rao's V stepwise method rendered a significance of zero chances in 10,000 that their selection was due to chance. The significance for the change in V was also impressive with the variable Readiness to Participate in Armed Conflict having the largest probability of being due to chance, 254 in 10,000. The canonical correlation was also impressive for this analysis being 0.8518013.

The last variable to enter the computations, Lack of Agreement in Relevant National Standards, was not considered a useful discriminating variable because there was lack of agreement between the U.S. and all other nations on various standards. The only agreement on standards was between European nations working together on codevelopment and/or coproduction projects. For this reason this variable was suppressed from entering the computation and the final model adopted had seven rather than eight variables. The result was that the removal of variable X13 became the last step in the analysis. Canonical correlation changed very slightly to 0.8504281 and the eigenvalue for the discriminant function was 2.61308.

The classification function coefficients and the standardized and unstandardized canonical discriminant function coefficients are given only for the total case analysis with X16 suppressed because of the significance of the variables and the high canonical correlation. The classification coefficients are in Table XIII and the canonical discriminant function coefficients are in Table XIV.

Table XIII
Classification Function Coefficients

Variable	Group 1	Group 2
X02	-.5277497	.5038466
X04	.7107391	-1.021965
X05	-.1209292	-.9869396
X06	5.295513	-5.475472
X07	6.788976	8.997007
X10	-5.056975	-1.532275
X17	.4858823	1.165894
(Constant)	-6.847483	-5.615881

Table XIV
Canonical Discriminant Function Coefficients

Variable	Standardized	Unstandardized
X02	0.23692	.2454003
X04	-0.23862	-.4121827
X05	-0.18715	-.2060101
X06	-0.95890	-2.562245
X07	0.17197	.5252553
X10	-0.23378	-.2442064
X17	0.13611	.1617640
Constant		1.646535

A close analysis of both the classification coefficients and the standardized canonical discriminant coefficients shows that a reordering of the intuitive expectations for both the relative importance and role in implementation or nonimplementation of the variables is necessary. Of the top ten variables that were intuitively expected to affect implementation the first, third and ninth ranked variables, internal stability of recipient country, offset agreement supports government policy and formal alliance in existence were not included as significant discrimina-

tors (Table XV). The failure of the first and third ranked variables to be effective discriminators was particularly surprising and will be addressed further in Chapter Five. The sixth and tenth ranked variables in the intuitive listing, formal commitment for development/production and balance of payments concerns were far more important than supposed in the actual experimental results. They ranked first and fourth, respectively.

The weight and sign of some of the classification function coefficients varied from what was intuitively expected. The top two variables, formal commitment for development/production and both governments seeking to expand employment base, were significant indicators for implementation. The sign of the third ranked variable, important to national prestige, is reversed from what was expected and this variable is an indicator for nonimplementation. The fourth ranked variable, concern for balance of payments, is negative for both the implemented and nonimplemented groups but is more negative for the implemented group. This variable is an indicator for nonimplementation. Recipient country development of home industry has both groups negative but the implemented group is less negative so this variable is an indicator for implementation. Provider willing to share technology

Table XV

Variable's Importance (Rank) to Discrimination
of Implemented or Non-Implemented Groupings

Variable	Name ¹	Intuition	(MV) ³	Total Cases ³
X01	Recipient Stability	1		
X02	National Prestige	2	3	3
X03	Policy for Offsets	3		
X04	Employment Base	4	2	2
X05	Industry Development	5	4	5
X06	Development/Production Commitment	7	1	1
X07	Share Technology	8		6
X08	Formal Alliance	9		
X09	Access or Basing	16		
X10	Balance of Payments Concerns	10	5	4
X11	Economy of Scale	11		
X12	Expropriation	Discarded		
X13	GNP > LDC	12	6	
X14	Able to Receive Technology	13		
X15	Able to Pay	14		
X16	Same Measurement Standards	15		
X17	Readiness Impact	6		7

- NOTES: 1. Short name used on computer run.
 2. Cases with missing variables discarded.
 3. Total cases run with variable X16 suppressed.

and impacts readiness to participate in armed conflict are positive for both groups but more positive for non-implementation.

The standardized canonical discriminant function coefficients represent the relative contribution of their variables to the discriminant function. In examining Table XIV, it is apparent that formal commitment for development/production is the single best discriminator. It contributes 44.3 percent of the discriminating power to the function. Next in order of importance are both governments seeking to expand employment base, important to recipient's national prestige and balance of payments concerns. Each one contributes approximately 11 percent of the discriminating power. The relative contribution of the remaining variables are recipient country development of home industry - 8.7 percent, provider willing to share technology - 7.9 percent, and impacts readiness to participate in armed conflict - 6.3 percent.

Examining Plots of Discriminant Scores

An examination of the plots of the discriminant scores for both the analysis with cases with missing values removed and the total case analysis with X16 suppressed shows that the variables selected give excellent discrimination between the implemented and nonimplemented groups. That they would be similar

should have been anticipated since the two analyses have five discriminating variables in common. Indeed the first three variables entered into the calculations are the same in both analyses and are entered in identical order. Plots of the analyses are shown in Figures 3 and 4. The canonical discriminant functions evaluated at the group centroids are given in Table XVI.

The classification results tables also give an excellent indicator of the power of these discriminating variables (Table XVII). For the analysis with missing values excluded 150 cases were in Group 1, the implemented group. The variables selected would have predicted 100 percent of those cases in Group 1. For that same analysis 29 cases were in Group 2, the nonimplemented group. Here the discrimination was not quite as good. The variables would have placed 8 of the cases (27.6%) in Group 1 and correctly classified the remainder (72.4%) in Group 2.

For the analysis with all cases included 157 cases were in Group 1, the implemented group. Again, the variables selected would have predicted 100 percent of those cases in Group 1. There were 34 cases in Group 2, the nonimplemented group. The variables would have placed 9 of the cases (26.5%) in Group 1 and correctly classified 25 cases (73.5%) in Group 2. Overall, the percent of grouped cases correctly classified was 95.29 percent.

Table XVI
Canonical Discriminant Functions Evaluated at
Group Centroids

	Group I	Group II
Function MV	-0.26248	2.57703
Function A	-0.74831	3.45542

NOTE: MV = Analysis With Missing Value
Cases Removed;
A = Total Cases Analysis

Table XVII
Classification Results

Actual Groups	No. of Cases	Predicted Group Membership	
		1	2
Group 1	157	157 100.0%	0 0.0%
Group 2	34	9 26.5%	25 73.5%
Percent of "Grouped" Cases Correctly Classified: 95.29%			

Figure 3

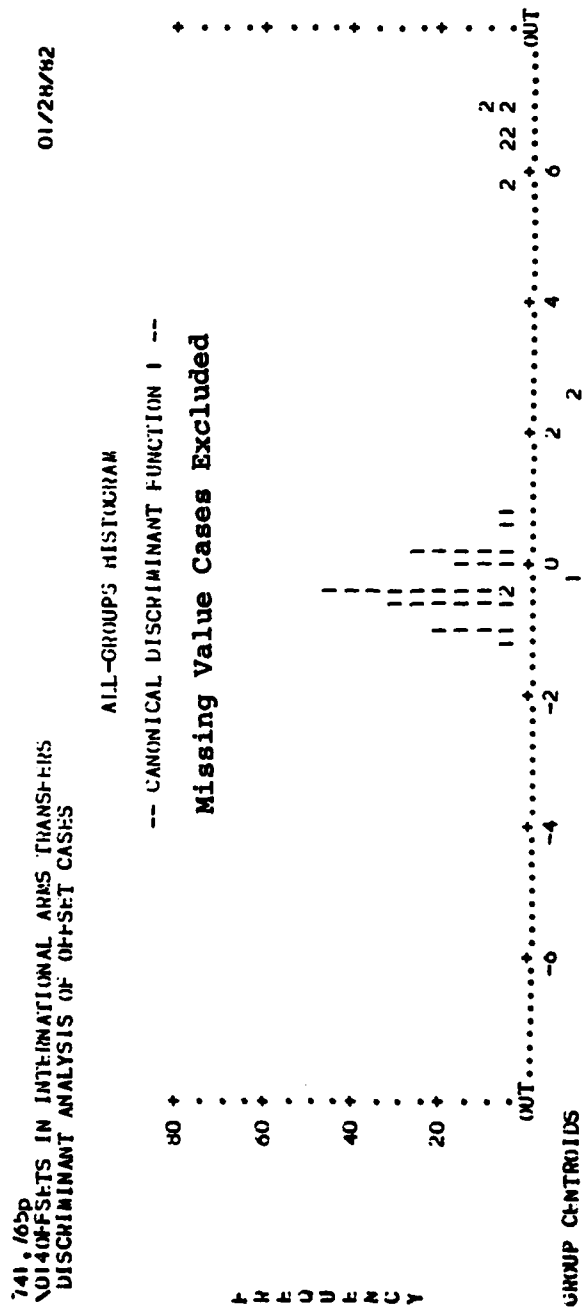
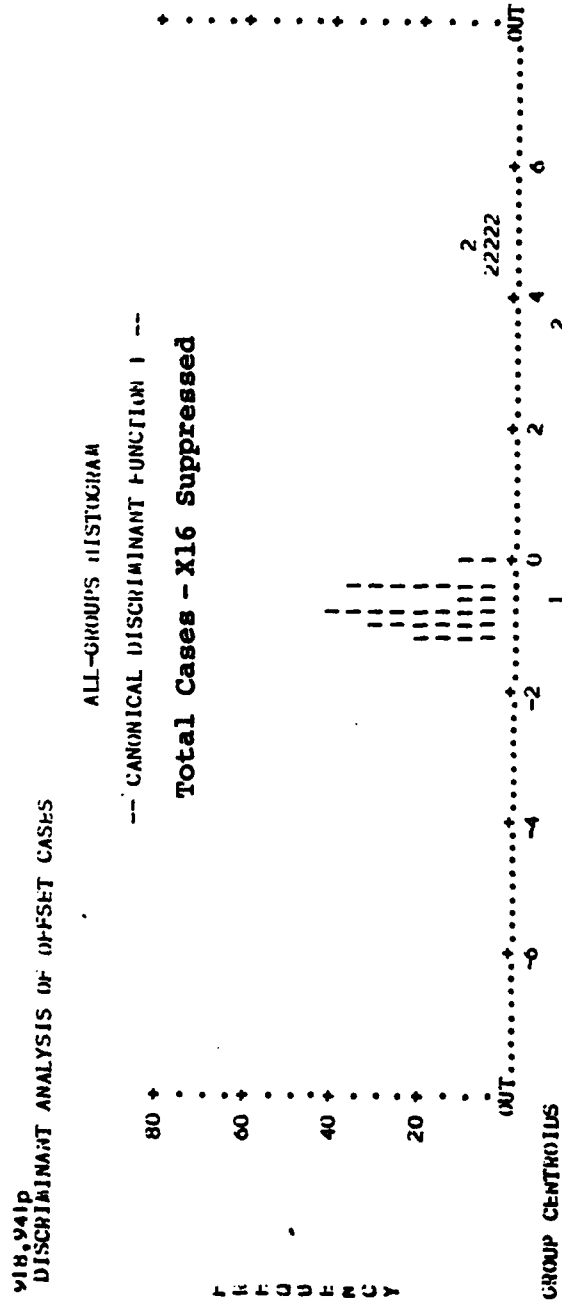


Figure 4



Chapter Five

Conclusions of the Analyses

This researcher has been most fortunate in that the questions and hypothesis posed at the initiation of this study have been answered in the desired manner. The questions that the research attempted to answer were two-fold.

- 1) Can a mathematical model be developed that would have described the likelihood for implementation of past offset proposals within national policy guidelines?
- 2) Can the model developed in 1) be utilized as a tool in the evaluation of future offset proposals?

The first question was answered affirmatively in Chapter Four. Due to the discriminating power of the selected variables, .0001 probability of being due to chance, the answer to the second question is also in the affirmative and the model is available for use. Its ultimate adoption as a tool will depend upon the willingness of top policy makers to employ mathematical models in their decision making process.

The single hypothesis of interest in this research was that political preferences, economic factors and national security considerations could be combined into a mathematical model for offset analysis. This hypothesis has been substantiated with a precision that was not to have been anticipated when the research began.

There is more to research, however, than drafting formulae, testing those formulae and publishing the results. In this concluding chapter to the study of offsets the difficulties encountered during the research will first be addressed. Then the significance of the results will be explored. Next will be a generalization of the results to other applications where the models developed may be useful. Then suggestions will be addressed to further research needs that became evident during the course of these efforts. Finally, we shall close with a brief summary statement.

Difficulties Encountered

The study of offsets in international arms transfers was not a consolidated, well-defined area for scholarly research at the initiation of this project. It is only slightly better known and defined today and tends to remain the province of a few

isolated experts. A definition, which it is hoped will find wide acceptability, is contained in Chapter One. Due, in part, to this lack of consolidation or definition, it was necessary to research writings, reports and studies in foreign military sales, grant aid, international logistics, technology transfer, arms transfers, peace and disarmament research, the economic issue of balance of payments, production/share costing, stability, and various treaties. Unless, or until, the study of offsets in international arms transfers becomes more consolidated, prospective researchers will have to continue to research this broad subject area.

Two of these areas are fertile arenas for research on their own. Those are the areas of stability and cooperative international logistics. Because of their scope, prospective researchers would do well to limit research in these two arenas. Cooperative international logistics is concerned with the total follow-on support to the weapons acquisition process. It need not be addressed if the research does not include these support systems. The area of stability needs better definition. In the current research it required extensive study that ended in the successful development of the Model for National Stability. But, then, stability was not included as a discriminator in the Model for the Evaluation of Offset Proposals in

International Arms Sales. Follow-up studies will need to be performed to determine whether or not that result was peculiar only to this study or whether stability actually has no influence on international arms transfers. For those researchers who are interested only in testing, improving, or changing the mathematical model developed here, research on stability will not be necessary.

Researcher assumptions affect the approach to any study and, when erroneous, contribute directly to the length and the cost of the research. This research suffered from two assumptions that were unfounded. The first was that the data would neatly fit a regression model formulation of an analysis of covariance. However, there were no results that could be varied by treatments. There were only results and no variables with either a causative or an affective role had been identified. The second unfounded assumption was that a model or scale for determining national stability existed and could be neatly adapted to this research. The resolution of that assumption involved an entirely new avenue of study to develop the Model for National Stability that is used in this research. From that point on it is hoped that this work reflects no assumptions made without a thorough check of their foundations.

The final difficulty encountered was getting

the research run on a computer and ensuring the proper format of output needed. Various approaches have been used in the past with varying degrees of success. But there is no substitute for intimate knowledge of the computer program and personal access to that program for data manipulation. Writing and debugging a control file broadens the researcher's awareness of the degree of legitimate data manipulation that is available. Had it not been for that, this analysis would have stopped short of the final run that was performed and which rendered a more parsimonious model.

Significance of the Results

Initially this research proposed 17 variables that might conceivably have a relationship to the implementation or nonimplementation of offset proposals. One variable, expropriation, was eliminated from the study at the beginning. This was because sponsorship of the venture by government at the Department of Defense/Ministry of Defense level is necessary so that expropriation would be of a home industry. Another variable, offset agreement supports both governments' policy, was eliminated early in the analysis because the official policy of the United States during the entire period included in the study was to not support offset agreements. The cases in

this study developed in spite of the officially stated policy.

One variable that intuitively looked like a good discriminator, lack of agreement on relevant national standards, was initially included in the discriminant function. However, the researcher chose to suppress that variable from the discriminant function after revisiting the raw data. In every case there was lack of agreement on national standards between the United States and any other country in the world. All of the cases of agreement were between other countries when the offset proposal was to share the technology of some other European nation. Even those nations that shared the foot/inch standard had different standards for liquid measures, sheet metal, threads, etc.

One variable that was initially included in the discriminant function and then excluded was the pure economic variable of GNP per capita greater than a Lesser Developed Country (LDC). It became evident in compiling the data that, if the political gains were compelling enough, this economic indicator was quickly ignored. Examples in the research were Japan, Italy, Korea and Taiwan while each was listed as a developing country.

The variable that intuition would have chosen as the key discriminator and for which the Model for

National Stability was devised, internal stability of the recipient nation, proved nonessential to the analysis. Had no limitations been placed on inclusion of the variables into the discriminant function so that all of the variables were eventually included, internal stability of the recipient nation would have been the last variable included. It may be that the dynamic nature of stability as developed in the stability model made it too changeable for use as a discriminator in this mathematical offset model. However, in other areas of concern the Model for National Stability will make it easier for policy makers to evaluate the potential for political change in nations with which we have diplomatic relations.

Inspection of the variable, formal alliance in existence, revealed that the United States generally does not carry out arms transfer transactions with nations with which it does not have security treaties. The lone exception in the entire research was an F-5 coproduction agreement with Switzerland. Therefore, it did not become a discriminator.

The variable, overflight/access rights, may have been subsidiary to formal alliances in existence, for it was not important to the analysis. We do not have basing/overflight rights with some of our long-time allies and in retrospect that would seem to be one

specification of a mutual defense or mutual security treaty.

The variable, economies of scale, was an impelling factor to seek an offset agreement for both those cases that were implemented and those that were not. It was too common to both cases, in retrospect, to be useful as a tool for discrimination.

Two variables that were not included in this discriminant function may become more useful given changed circumstances and future researchers may wish to reopen the question. They were ability of the recipient nation to share in the technology and ability of the recipient nation to meet financial obligations under the agreement. The rationale for looking at these variables again in the future is due to a question of the adequacy of documenting those offset proposals that are rejected early in the process. This research used the universe of known nonimplemented offset proposals. But according to Mr. Mark Easton of the Department of State there is no way of knowing how many potential proposals are cut short by the influence of personnel in the MAAGs.¹

¹Statement by Mr. Mark Easton, Office of Security Assistance and Sales, Department of State, personal interview, Washington, D.C., October 13, 1981.

Turning to those variables that are in the discriminant function, it may be useful to revisit the hypothesis and see how well the selected variables are suited to it. The hypothesis was that political preferences, economic factors, and national security considerations could be combined into a mathematical model for offset analysis. Looking at the included variables there is one that is a purely political factor, important to national prestige; one that is a purely economic factor, concern for the impact of balance of payments; and one that is a purely national security factor, impacts readiness to participate in armed conflict. There are three factors that are confounded political and economic factors; both governments seeking to expand the employment base, recipient nation seeking to develop a home industry, and both governments have made a formal commitment for development/production. Finally, there is one variable that is a triply confounded political, economic and national security factor, providing country is willing to share technology. The selected variables then are well suited to the proposition contained in the hypothesis.

Generalization of the Results

Given that the hypothesis is satisfied by the selected variables, of what use is the research? First, the Model for the Evaluation of Offset Proposals can be used to evaluate offset proposals received from other nations to determine the likelihood of implementation or nonimplementation of the particular proposal. Secondly, the Model for National Stability has the potential for widespread usage in quickly evaluating the political stability of nations seeking business, commercial as well as governmental, with the United States.

The Model for the Evaluation of Offset Proposals can be used in its present form with some modifications or it can be altered for long-term efficiency in use. See Appendix K for a modified control program.

The Model for National Stability is a simple, manual model and can be used in its present form without modification. It will give as accurate an indication as the data put into it permits. If the input is distorted, so will be the output. But the model provides a guideline where none existed before. It is an initial stepping stone where questions of national stability are important.

One last point of interest needs to be mentioned. During the research, cases of general offset agreements were noted and listed. None of them had a specific weapon system for development or production and generally no tangible results could be ascertained. All of these cases were listed as nonimplemented. They were discussed with Mr. Frank Cevasco of the Department of Defense during an interview and he defended them as being invaluable in the offset proposal process. According to Mr. Cevasco these general agreements help to ferret out generalized objections to participation in an offset agreement with the particular country before specific proposals are sought. Thus, potentially embarrassing objections which might damage the credibility of the Department of Defense or of the nation are avoided.²

Suggestions For Further Research

In the section of this chapter entitled "Difficulties Encountered" the general lack of consolidation in this area of interest was mentioned. That lack of consolidation necessitated reading and research in a broad area of subjects. As the

²Statement by Mr. Frank Cevasco, Office of International Security Policy, Department of Defense, personal interview, Washington, D.C., October 13, 1981.

gestalt³ encompassing offsets in international arms transfers formed, suggested areas for further research began to emerge.

The initial intent of this research had been to devise a normative predictive model for the implementation or nonimplementation of offset proposals in international arms transfers. The state of knowledge in the subject area at the time made that goal unrealistic and it was changed to developing a descriptive model. Now that a descriptive model has been developed, the possibility of developing a normative, predictive model is not so unrealistic. Future researchers may wish to use this research as a departure point for developing a normative model.

Much of the information gleaned from past offset programs came from individual case studies. It became evident that a growing body of literature was describing the problems encountered and solved in the micro-management of individual programs. That same body of literature also criticized the lack of macro-management policy for offset proposals in international arms transfers. This current research explored one small element of that problem, but the coordination

³In Gestalt Psychology "pragnanz" is the process of organizing perceptions into meaningful wholes and the "gestalt" is the result or meaningful whole.

requirements between the various government agencies and contractors involved in offsets is still a very fertile field for research.

The effort in this research to develop the Model for National Stability was a fruitful attempt at modeling that produced useful, though somewhat subjective, results. The whole question of national stability and how it can be described and quantified is still a verdant area for further research.

Cooperative logistics was mentioned in discussing the literature search as a major area for research that was related to but distinct from offset proposals in international arms transfers. Once a weapon system is built it has to be maintained and that is the arena of logistics. When it has to be maintained for several countries with differing national standards, the same problems must be solved as were solved for codevelopment or coproduction.

Lastly, is an area where the entire knowledge base is still speculative: impacts of technology transfer on national security concerns. Little experience in this area was evident during this research. Any aspect of the impacts of technology transfer on business and/or government would be a worthwhile subject for further research, whether or not it dealt with national security impacts.

Summary

This research was important to a better understanding of the offset process and to why some codevelopment or coproduction proposals are implemented and why some are not. A number of important contributions have been provided by the study. First of all, it provides in one place a useful tracing of the evolution of the offset process. Secondly, the study provides a global look at the various governmental departments that have responsibilities for portions of the offset proposal process. Thirdly, it resulted in an operations research technique that can aid policy decision makers in cutting the long lead times and heavy investments of resources normally associated with an offset project. Fourth, it resulted in a new method for evaluating national stability that can reduce the decision makers area of unknown variability. Fifth, it helped objectively uncover some important factors in why countries cooperate. Lastly, it highlighted some critical areas where further research would be fruitful.

VI. BIBLIOGRAPHY

BOOKS

- Alchian, Armen A., and William R. Allen. Exchange and Production Theory in Use. Belmont, California: Wadsworth Publishing Company, 1969.
- Almond, Gabriel A. The American People and Foreign Policy. New York: Frederick A. Praeger, 1960.
- Baumol, William J. Economic Theory and Operations Analysis. 2d ed. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965.
- Beilenson, Laurence W. The Treaty Trap. Washington, D.C.: Public Affairs Press, 1969.
- Beldin, David L., and Ernest G. Cammack. Procurement. Unnumbered Volume in National Security Management Series, Washington, D.C.: Industrial College of the Armed Forces, 1973.
- Blackey, Robert. Modern Revolutions and Revolutionists; A Bibliography. Santa Barbara, California: Clio Press, Inc., 1976.
- Bolch, Ben W., and Cliff J. Huang, Multivariate Statistical Methods for Business and Economics. Englewood Cliffs, N.J.: Prentice-Hall, 1974.
- Branson, William H. Macroeconomic Theory and Policy. New York: Harper and Row Publishers, 1972.
- Carlton, David and Carlo Schaerf, eds., Arms Control and Technological Innovation. New York: John Wiley and Sons, Halsted Press, 1976.
- Chiang, Alpha C. Fundamental Methods of Mathematical Economics. 2d ed. New York: McGraw-Hill Book Company, 1974.
- Cooley, William W., and Paul R. Lohnes. Multivariate Data Analysis. New York: John Wiley and Sons, Inc., 1971.

- Crozier, Brian, ed. Annual of Power and Conflict. London: Institute for the Study of Conflict, 1971-1979.
- Gimlin, Hoyt, Jeanne D. Heise and I. D. Fuller, ed. Editorial Research Reports on Political Instability Abroad. Washington, D.C.: Congressional Quarterly Inc., 1976.
- Goldstein, Matthew and William R. Dillon, Discrete Discriminant Analysis. New York: John Wiley and Sons, 1978.
- Gupta, Shiv K., and John M. Cozzolino. Fundamentals of Operations Research for Management. San Francisco, California: Holden-Day, Inc., 1975.
- Haugh, LeRoy J. International Logistics: Foreign Military Sales. Washington, D.C.: Industrial College of the Armed Forces, 1967.
- Holsti, Kalevi J. International Politics: A Framework for Analysis. 3rd ed. Englewood Cliffs, N.J.: Prentice Hall, Inc., 1977.
- Hughes, Colin A. Political Stability and Political Behaviour. St. Lucia, Queensland, Australia: University of Queensland Press, 1968.
- International Bank for Reconstruction and Development. World Development Report. Washington, D.C.: World Bank, 1978, 1980.
- _____. World Tables. Washington, D.C.: World Bank, 1971.
- _____. World Tables. Baltimore, Maryland: The Johns Hopkins University Press, 1976.
- _____. World Tables. 2d ed. Baltimore, Maryland: The Johns Hopkins University Press, 1980.
- Jane's. All the Worlds Aircraft, 1955-1978.
- _____. Fighting Ships, 1958-1978.
- _____. Infantry Weapons, 1968-1978.
- _____. Weapon Systems, 1968-1978.

- Janowitz, Morris. Political Conflict: Essays in Political Sociology. Chicago: Quadrangle Books, 1970.
- Kapoor, A., and Phillip D. Grub, eds. The Multi-national Enterprise in Transition. Princeton, New Jersey: The Darwin Press, 1972.
- Kugel, Yerachmiel, and Gladys W. Gruenberg. International Payoffs. Lexington, Massachusetts: Lexington Books, D. C. Heath and Company, 1976.
- Kwak, N. K. Mathematical Programming With Business Applications. New York: McGraw-Hill Book Company, 1973.
- _____, and Stephen A. Delurgio. Quantitative Models for Business Decisions. North Scituate, Massachusetts: Duxbury Press, 1980.
- Lee, Sang M. Goal Programming for Decision Analysis. Philadelphia: Auerbach Publisher, Inc., 1972.
- Liska, George. States in Evolution: Changing Societies and Traditional Systems in World Politics. Studies in International Affairs Number 19. Baltimore, Maryland: The Johns Hopkins University Press, 1973.
- Long, Franklin A., and George W. Rathjens, eds. Arms, Defense Policy, and Arms Control. New York: W. W. Norton and Company, Inc., 1976.
- Macfarlane, Leslie J. Violence and the State. London: Thomas Nelson and Sons, Ltd., 1974. Reprinted by Crane, Russak and Company, Inc., New York.
- McKenna, Joseph P. Aggregate Economic Analysis. 3d ed. New York: Holt, Rinehart and Winston, 1969.
- McLaren, William D. United States Defense Industry Guide for Conducting Business with NATO Organizations and Member Countries. Washington, D.C.: U.S. Government Printing Office, 1971.
- Milnor, Andrew J. Elections and Political Stability. Boston: Little, Brown and Company, 1969.
- Morrison, Donald F. Multivariate Statistical Methods. 2d ed. New York: McGraw-Hill Book Company, 1976.

Mosteller, Frederick, and John W. Tukey. Data Analysis and Regression. Reading, Massachusetts: Addison-Wesley Publishing Company, 1977.

Neter, John, and William Wasserman. Applied Linear Statistical Models. Homewood, Illinois: Richard D. Irwin, Inc., 1974.

Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner and Dale H. Bent. SPSS: Statistical Package for the Social Sciences. 2d ed. New York: McGraw-Hill Book Company, 1970.

Nordlinger, Eric A. Conflict Regulation in Divided Societies. Harvard University: Center for International Affairs, Occasional Papers in International Affairs, No. 29, Jan. 1972.

Northedge, F. S. The Use of Force in International Relations. New York: The Free Press, 1974.

O'Neill, Bard E., William R. Keaton, and Donald J. Alberts, ed. Insurgency in the Modern World. Boulder, Colorado: Westview Press, 1980.

Pirages, Dennis. Managing Political Conflict. New York: Praeger Publishers, 1976.

Richardson, R. P. Jr., S. Waldron, C. R. Berndtson, L. E. Brumbach, G. Hertweck, L. R. Hosner, P. J. Mode, R. N. Perle, J. A. Tegger, and R. P. Whitten. An Analysis of Recent Conflicts. Center for Naval Analysis Research Contribution No. 144. Rochester, New York: Institute for Naval Analysis, 1966.

Richmond, Samuel B. Operations Research for Management Decisions. New York: The Ronald Press, 1968.

Robock, Stefan H., and Kenneth Simonds. International Business and Multinational Enterprises. Homewood, Illinois: Richard D. Irwin, Inc., 1973.

Rosen, Steven J. and Walter S. Jones. The Logic of International Relations. 2d ed. Cambridge, Massachusetts: Winthrop Publishers, Inc., 1977.

Rosenau, James N., ed. Linkage Politics: Essays on the Convergence of National and International Systems. New York: Free Press, 1969.

Samuelson, Paul A. Economics: An Introductory Analysis. 6th ed. New York: McGraw-Hill Book Company, Inc., 1968.

Smith, Garry M. Flashpoints: A Bibliography on Political Conflicts Throughout the World. Hartlepool, Cleveland, United Kingdom: Headland Press, 1979.

Sondermann, Fred A., David S. McLellan and William C. Olson, ed. The Theory and Practice of International Relations. 5th ed. Englewood Cliffs, N.J.: 1979.

Spurr, William A., and Charles P. Bonini. Statistical Analysis for Business Decisions. Rev. ed. Homewood, Illinois: Richard D. Irwin, Inc., 1973.

Stern, Ellen P., ed. The Limits of Military Intervention. Beverly Hills, California.

Stockholm International Peace Research Institute. World Armaments and Disarmament: SIPRI Yearbook. New York: Humanities Press, 1966-1978.

Tapper, Ted. Political Education and Stability: Elite Responses to Political Conflict. London: John Wiley and Sons Ltd., 1976.

Theodore, Chris A. Applied Mathematics: An Introduction. Rev. ed. Homewood, Illinois: Richard D. Irwin, Inc., 1971.

Thierauf, Robert J., and Robert C. Klekamp. Decision Making Through Operations Research. 2d ed. New York: John Wiley and Sons, Inc., 1975.

_____. Treaties and Alliances of the World. Bonn-Vienna-Zurich: Keesings Publications, U.S. edition. New York: Charles Scribner's Sons, 1974.

United Nations Conference on Trade and Development (UNCTAD). Handbook of International Trade and Development Statistics. New York: United Nations, 1979.

U. S. Department of State. Treaties in Force: A List of Treaties and Other International Agreements of the United States in Force on January 1, 1980. Department of State Publication 9136. Washington, D. C.: Government Printing Office, 1980.

Vandeventer, Elliott Jr. International Logistics: Interallied Collaboration in Weapons Production. Washington, D.C.: Industrial College of the Armed Forces, 1967.

Wagner, Harvey M. Principles of Management Science With Applications to Executive Decisions. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.

PERIODICALS, REPORTS AND INTERVIEWS

Aviation Week and Space Technology, 1960-1978.

Baas, Melvin T. "United States Involvement in CoDevelopment: An Analysis of the US/FRG V/STOL Fighter Aircraft Project and NATO Seasparrow Project." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1971.

Banas, John M., and James R. Reid. "A Case History of the Coproduction of the F-5E Aircraft by the United States of America and the Republic of China." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1975.

Barten, George A. "Topics of Interest - International Logistics," (in Defense Logistics Studies Information Exchange), report of Acting Director of International Logistics, U.S. Army Materiel Command, Washington, D.C., July 7, 1967.

Battelle Memorial Institute. "MBT-70 Producibility/Cost Reduction Study, Associated Studies Report 3, Component Procurement Alternatives for the MBT-70 Program: An Economic Analysis." Unpublished research report, Columbus, Ohio, 1969.

Behrman, Jack Norton. "Foreign Aid as a Technique in Attaining United States International Economic Objectives." Doctoral dissertation, Princeton University, 1952.

Berry, Arnold M., and Edward A. Petersen, "RF-4 Coproduction: United States and Federal Republic of Germany." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1975.

- Biederman, Harry Robert. "The Influence of Decreasing Costs on International Trade and Cooperation in Aerospace Products." Doctoral dissertation, Columbia University, 1968.
- Carlisle, Edwin Richard. "Structure of Foreign Sales: Exports and Subsidiary Productions." Doctoral dissertation, Rutgers University, 1974.
- Catledge, Morris B., and Larrie F. Knudsen. "Foreign Military Sales: United States Involvement in Coproduction and Trends Toward Codevelopment." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1969.
- Cevasco, Frank. Office of the Secretary of Defense International Security Policy. Washington, D.C.: Personal interview, 13 October 1981.
- Cheng, Chi Ming. "The Determinants of International Trade of Manufactures: An Empirical Study." Doctoral dissertation, Yale University, 1973.
- Churchill, Gilbert A., Jr. "A Regression Estimation Method for Collinear Predictors." Decision Sciences, 6:670-687, 1975.
- Coleman, James T., Arthur C. Coulter, James J. Dehen, Clarence D. Ehrlich, and William R. Georges. "On Some Aspects of Foreign Military Sales." Research report, Air Command and Staff College, Air University, Maxwell Air Force Base, Alabama, 1975.
- Cornell, Alexander Herbert. "An Analysis of International Collaboration in the Organization and Management of Weapons Coproduction." Doctoral dissertation, American University, Washington, D.C., 1969.
- Cornell, Alexander Herbert. "International Codevelopment and Coproduction of Weapons: Some Conclusions and Future Prospects." Naval War College Review, XXIII, no. 4 (December, 1970), pp. 64-75.
- Daniels, John Day. "Recent Foreign Direct Manufacturing Investment in the United States, An Interview Study of the Decision Process." Doctoral dissertation, University of Michigan, 1969.
- Day, Bonner. "The F-16 Goes Operational." Air Force Magazine, 62:1:34-37, January, 1979.

"The Defense Industry: The Pentagon Escalates Its Budget and the Fallout Is Widespread." Financial World, November 15, 1976, pp. 32-33.

"DOD Loses Millions in Foreign Sales." Air Force Times (Washington, D.C.), 5 September 1977.

Dolins, Stanley Lester. "The Economic Allocation of Share-Costs in Joint International Ventures: An Examination of the NATO and OECD-DAC Experience." Doctoral dissertation, University of Colorado, 1965.

Easton, Mark. Department of State, Office of Security Assistance and Sales. Washington, D.C.: Personal interview, 13 October 1981.

Fifer, Sheila Kean. "Foreign Military Sales and U.S. Weapons Costs." Unpublished staff paper, Congressional Budget Office, Washington, D.C., 1976.

Finn, John M. "Topics of Interest - International Logistics," (in Defense Logistics Studies Information Exchange). Report of Director of International Logistics, U.S. Army Materiel Command, Washington, D.C., October 31, 1966.

Foreign Military Sales Lessons Learned, Chief of Naval Material. (Contains errors in procurement for foreign military sales and corrections made by the U.S. Navy in 1976.) Defense Logistics Studies Information Exchange, United States Army Logistics Management Center, Fort Lee, Virginia, 22 February 1977.

Gulkey, David R., and James L. Murphy. "Directed Ridge Regression Techniques in Cases of Multi-collinearity." Journal of the American Statistical Association, 70:769-775, December, 1975.

Hall, G. R., and R. E. Johnson. "Aircraft Co-Production and Procurement Strategy: A Report Prepared for United States Air Force Project Rand." Unpublished research report, Rand Corporation, Santa Monica, California, May, 1967.

Hankee, William B. "The Role of Arms Trade in a Changing World Environment." Unpublished research memorandum, Strategic Studies Institute, Army War College, Carlisle Barracks, Pennsylvania, 1976.

Hoerl, Arthur E., and Robert W. Kennard. "Ridge Regression: Applications to Nonorthogonal Problems." Technometrics, 12:1:69-82, February, 1970.

_____, and Robert W. Kennard. "Ridge Regression: Biased Estimation for Nonorthogonal Problems." Technometrics, 12:1:55-66, February, 1970.

Holliday, William Albert. "Applications of Mathematical Programming and Working Line Theory to Production and Inventory Control in Small Airframe Manufacturing." Doctoral dissertation, University of Texas, 1966.

Howard, Joe Arvid. "Transfer of Technology Between Developed Nations: An Analysis of USAF International Cooperative R and D." Doctoral dissertation, The George Washington University, 1974.

Hunter, George Fletcher. "An Evaluation of USAF Cooperative R & D." Research Report, Defense Systems Management School, Fort Belvoir, Virginia, 1975.

International Logistics Lessons Learned, U.S.A. Missile Command. (Contains errors in international missile transactions and corrective actions taken during 1976.) Defense Logistics Studies Information Exchange, United States Army Logistics Management Center, Fort Lee, Virginia, 15 December 1976.

Ising, Thomas J. "A Target-Instrument Policy Model in International Trade." Doctoral dissertation, University of Illinois at Urbana-Champaign, 1971.

Jones, B. D., and K. L. Kunz. "US/FRG Heavy Equipment Transporter Program, HET-70: Final Report, HET-70 Planning." Unpublished study, Chrysler Corporation, Detroit, Michigan, May 16, 1966.

Jones, B. D., and K. L. Kunz. "US/FRG Heavy Equipment Transporter Program: Final Report, Joint Concept and Design Studies, HET-70 Joint Task Force." Unpublished study, Chrysler Corporation, Detroit, Michigan, May 16, 1966.

Koizumi, Tetsunori. "An Analysis of Factor Substitution in the Multi-Factor Product Process." Doctoral dissertation, Brown University, 1970.

- Kreimer, Robert Maurice. "Cultural Interface in Foreign Procurement." Master's thesis, Naval Postgraduate School, Monterey, California, 1974.
- Kugel, Yerachmiel, "A Decisional Model for the Multinational Firm." Management International Review, 13:3-16, 1973.
- Leach, Arthur S., and Dennis H. Majkowski. "An Analysis of the F-16 Offset Commitment." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1975.
- Lukens, Howard Ivan. "Co-Production Within the United States Helicopter Industry." Doctoral dissertation, The George Washington University, 1975.
- Marquardt, Donald W. "Generalized Inverses, Ridge Regression, Biased Linear Estimation, and Non-linear Estimation." Technometrics, 12:3:591-611, August, 1970.
- _____, and Ronald D. Snee, "Ridge Regression in Practice." The American Statistician, 29:1:3-20, February, 1975.
- McChesney, Jack Lester. "The Evolution of the Foreign Military Sales Program and Its Impact on Defense Procurement Policies and Procedures." Doctoral dissertation, George Washington University, 1976.
- Montgomery, John W. "Industry Survey: Attitudes Towards DOD/Industry Interface Under Foreign Military Sales." Research report, Defense Systems Management School, Fort Belvoir, Virginia, 1975.
- Morgan, Robert D. "TCN Spain: A New Dimension in U.S. Foreign Military Sales." Signal, 30:1:19-21, September, 1975.
- Morse, David L. "Economic Issues in Foreign Military Sales." Unpublished research paper, Naval War College, Newport, Rhode Island, 1975.
- Murphy, Crawford O. "An Analysis of Foreign Military Sales and Cooperative Logistics Support Arrangements." Unpublished research report, Air War College, Air University, Maxwell Air Force Base, Alabama, 1975.

Newcomb, Harold. "The Combat Co-op." Airman Magazine, 22:2:20-26, February, 1978.

Oh, Moonson. "The Role of International Corporations in the Transfer of Technology to Developing Countries." Doctoral dissertation, University of Pennsylvania, 1970.

Ohman, Nils B., Jerome Parker, and Kenneth Sweeney. "Air Combat Fighter: European System Program Office Management Issues and Design." Unpublished research report for the Air Force Business Research Management Center, The University of Texas at Austin, 1974.

Ohtani, Yashihiko. "Theory of International Trade and Properties of the Production Possibility Set." Doctoral dissertation, University of Minnesota, 1969.

Pagano, Stephen J. "Case History of the M113 Armored Personnel Carrier Italy Co-Production Project (First 3,000 Vehicles)," November 1962-June 1976. Unpublished case history, Co-Production Management Office, Directorate of International Logistics, U.S. Army Materiel Command, Washington, D.C., 1972.

Pincus, John. "Economic Aid and International Cost Sharing: A Report Prepared for the Office of the Assistant Secretary of Defense, International Security Affairs." Rand Corporation, Santa Monica, California, 1965.

Quick, George Stern. "Industry Integration Committees of the Army Ordnance Department." Doctoral dissertation, University of Michigan, 1954.

Rath, Henry John. "An Evaluation of Management Techniques Used in the International Transfer of the Production Know-How of the Litton LN-3 Inertial Navigation System." Doctoral dissertation, University of California at Los Angeles, 1972.

Seeger, Murray. "U.S., NATO Countries Sharing Benefits from F-16 Fighter Deal." Los Angeles Times, December 24, 1978.

Smith, Langford Wheaton, Jr. "An Approach to Costing Joint Production Based on Mathematics Programming with an Example from Petroleum Refining." Doctoral dissertation, Leland Stanford University, 1962.

- Teece, David John. "The Multinational Corporation and the Resource Cost of International Technology Transfer." Doctoral dissertation, University of Pennsylvania, 1975.
- Ulsamer, Edgar, ed. "NATO on the Road Toward a 'Coalition Warfare' Posture." Air Force Magazine, 61:1:50-56, January, 1978.
- U.S. Comptroller General. Benefits and Drawback of U.S. Participation in Military Cooperative Research and Development Programs With Allied Countries. Report to the Congress (by R. M. Keller). Washington, D.C., 1973.
- U.S. Comptroller General. Critical Considerations in the Acquisition of a New Main Battle Tank. Report to the Congress (by Reuben B. Ateste). Washington, D.C., 1976.
- U.S. Comptroller General. Foreign Military Sales - A Growing Concern. Report to the Congress (by Reuben B. Ateste). Washington, D.C., 1976.
- U.S. Department of State. Department of State Bulletin. Washington, D.C.: Superintendent of Documents, 1960-1978.
- U.S. General Accounting Office. Patrol Hydrofoil Guided Missile Ship. Unpublished Staff Study, Washington, D.C., 1975.
- U.S. Military Academy Conference on Arms Transfers. Final Report of the Senior Conference on Arms Transfers Held at the United States Military Academy, West Point, New York, June 10-12, 1976. West Point, New York, 1976.
- University of Virginia Conference on Procurement and Grants Management: Proceedings of the 1976 International Conference on Procurement and Grants Management Held at the Boar's Head Inn, Charlottesville, Virginia, April 28-30, 1976. Charlottesville, Virginia: School of Continuing Education, University of Virginia, 1976.
- White, Sydney R., and Frank T. Logan. "An Evaluation of the Cooperative Logistics Support Program Between the United States and Friendly Foreign Governments." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1968.

- Williams, William B., and C. Eugene Beeckler.
 "International Cooperative Materiel Acquisition Programs." Research paper, U.S. Army Logistics Management Center, Fort Lee, Virginia, 1976.
- Wilson, Robert Woodrow. "The Sale of Technology Through Licensing." Doctoral dissertation, Yale University, 1975.
- Winn, Lynton T., and James J. Dunlap. "Foreign Military Sales Legislation: Impact on the Achievement of United States Foreign Policy Objectives and Its Implication for the Department of Defense." Master's thesis, School of Systems and Logistics, Air Force Institute of Technology, 1975.
- Wolf, Bernard Martin. "Internationalization of U.S. Manufacturing Firms: A Type of Diversification." Doctoral dissertation, Yale University, 1971.
- Young, John R. "Program Management for Foreign Military Sales." Research report, Defense Systems Management School, Fort Belvoir, Virginia, 1975.

Appendix A

U.N. Least Developed Countries

(by year of inclusion)

1971

Afghanistan	Lao PDR	Sikkim
Benin	Lesotho	Somalia
Bhutan	Malawi	Sudan
Botswana	Maldives	Uganda
Burundi	Mali	United Republic of Tanzania
Chad	Nepal	Upper Volta
Ethiopia	Niger	Samoa
Guinea	Nwanda	Yemen Arab Republic
Haiti		

(Note: PDR abbreviation for People's Democratic Republic)

1975

Bangladesh	Democratic Yemen
Central African Republic	Gambia

1977

Cape Verde and the Comoros

Source: UNCTAD Handbook of International Trade and Development Statistics, 1979.

Appendix B

U.N. Major Petroleum Exporters

1974

Algeria	Indonesia	Oman
Angola	Iran	Quatar
Bahrain	Iraq	Saudi Arabia
Brunei	Kuwait	Trinidad and Tobago
Ecuador	Libyan Arab Jamahiriya	United Arab Emirates
Gabon	Nigeria	Venezuela

Source: UNCTAD Handbook of International Trade and
Development Statistics, 1979.

Appendix C

Developed Countries List

Based Upon GNP per Capita of \$1,000 or more

(International Bank for Reconstruction and Development)

1950¹

Industrialized Countries

Australia
Canada
Denmark
Luxembourg
Netherlands Antilles²
New Zealand
Norway
Sweden
Switzerland
United Kingdom
U.S.A.

Oil Exporting Countries

Kuwait

1955¹ (Added)

Industrialized Countries

Belgium
Finland
France
Federal Republic of Germany
Iceland

1960¹ (Added)

Industrialized Countries

Netherlands

Appendix C (Continued)

1965¹ (Added)Industrialized CountriesAustria
IsraelCentrally Planned Economies

German Democratic Republic

1968¹ (Added)Industrialized CountriesItaly
Japan
Puerto Rico³Oil Exporting Countries

Libya

Centrally Planned Economies

Czechoslovakia

1970⁴Industrialized Countries (Added)Ireland
South AfricaIndustrialized Countries (Deleted)Israel⁵Oil Exporting Countries (Added)Abu Dhabi
Qatar
United Arab EmiratesCentrally Planned Economies

Data Not Available

Appendix C (Continued)

1976⁶ (Added)

Oil Exporting Countries

Oman
Saudi Arabia

Centrally Planned Economies

Bulgaria
Hungary
Poland
USSR

1978⁷

Industrialized Countries (Deleted)

South Africa⁸

Oil Exporting Countries (Added)

Iran
Iraq

Centrally Planned Economies

Romania

Notes:

1. International Bank of Reconstruction and Development, World Tables (Washington, D.C.: World Bank, 1971).

2. Netherlands Antilles included with Netherlands after parent country reached criteria for inclusion in 1960.

3. Puerto Rico included in data for USA in 1970.

4. International Bank of Reconstruction and Development, World Tables (Baltimore, Md.: The Johns Hopkins University Press, 1976).

Appendix C (Continued)

5. Israel deleted from list of Industrialized Countries after qualification broadened beyond GNP per capita to include increased levels of other industry in addition to manufacturing.

6. International Bank of Reconstruction and Development, World Development Report (Washington, D.C.: World Bank, 1978).

7. International Bank of Reconstruction and Development, World Tables, the second edition (Baltimore, Md.: The Johns Hopkins University Press, 1980); and World Development Report (Washington, D.C.: World Bank, 1980).

8. Reason for deletion of South Africa from list of Industrialized Countries not explained in either World Tables or World Development Report.

Appendix D

Countries With Codevelopment/Coproduction Agreements With the United States That Have Permitted Basing Rights

<u>Country</u>	<u>Implementing Agreement/Year</u>
<u>Current</u>	
Belgium	NATO, 1951
Federal Republic of Germany	NATO, 1954
Greece	NATO, 1951
Italy	NATO, 1951
Netherlands	NATO, 1951
Spain	Bilateral Agreement, 1954
Turkey	NATO, 1951
United Kingdom	Bilateral Agreement, 1940
Australia	ANZUS Treaty, 1951
Japan*	Mutual Defense Assistance Agreement, 1954
Korea	Bilateral Agreement, 1953
Canada	Bilateral Agreements, 1940
Philippines	Bilateral Agreement, 1947 & 1979
Portugal	Bilateral Agreement (Azores Only), 1951
<u>Terminated Prior Agreements</u>	
France (1966)	Bilateral Agreement, 1952
Iran (1979)	Bilateral Agreement, 1950
Taiwan (ROC) (1979)	Bilateral Security Agreement, 1956

*Note: Prior basing and overflight rights authorized
by World War II Instruments of Surrender.

Sources: Stockholm International Peace Research
Institute, World Armaments and Disarmament:
SIPRI Yearbook 1972 (New York: Humanities
Press, 1972), pp. 250-7.

U.S. Department of State, Treaty Affairs
Staff, Office of the Legal Advisor, Treaties
in Force, Department of State Publication
9136. Washington, D.C., U.S. Government
Printing Office, 1980.

23

Appendix E

Codevelopment/Coproduction Proposals

(Countries by Years In Which at Least One
Proposal Was Received or Rendered)

<u>Country</u>	<u>Years</u>
1. Argentina	1959, 1965, 1970
2. Australia	1960
3. Belgium	1958, 1959, 1960, 1963, 1968, 1975, 1977
4. Canada	1954, 1959, 1960, 1962, 1964-66, 1969
5. Denmark	1960, 1962, 1968, 1975, 1977
6. France	1958-60, 1963, 1965, 1968, 1975, 1978
7. Germany, Federal Republic	1958-60, 1963, 1965, 1968, 1971-73, 1975, 1977-78
8. Greece	1968
9. India	1960
10. Iran	1970
11. Italy	1952, 1955, 1959-60, 1963-65, 1968-69, 1973-74, 1977-78
12. Japan	1953, 1955-56, 1958-60, 1967, 1969, 1977-78
13. Korea	1971-73
14. Netherlands	1958-60, 1966-68, 1975, 1977
15. Norway	1960, 1962, 1964, 1966, 1968, 1975, 1977-78
16. Philippines	1974
17. Portugal	1960, 1968
18. Spain	1964-65
19. Switzerland	1975
20. Taiwan	1966-67, 1969, 1972-73
21. Turkey	1960, 1962, 1968, 1972
22. United Kingdom	1956, 1959-60, 1962, 1965-66, 1969, 1975, 1978

Appendix F

Codevelopment/Coproduction Proposals

Cross-Reference List

(Years in Which at Least One Proposal Was Received
or Rendered by Countries)

<u>Year</u>	<u>Countries</u>
1952	Italy
1953	Japan
1954	Canada
1955	Italy, Japan
1956	Japan, U.K.
1958	Belgium, France, FRG, Japan, Netherlands
1959	Argentina, Belgium, France, FRG, Italy, Japan, Netherlands, U.K.
1960	Australia, Belgium, Canada, Denmark, France, FRG, India, Italy, Japan, Netherlands, Norway, Portugal, Turkey, U.K.
1962	Canada, Denmark, Norway, Turkey, U.K.
1963	Belgium, France, FRG, Italy
1964	Canada, Italy, Norway, Spain
1965	Argentina, Canada, France, FRG, Italy, Spain, U.K.
1966	Canada, Netherlands, Norway, Taiwan, U.K.
1967	Japan, Netherlands, Taiwan
1968	Belgium, Denmark, France, FRG, Greece, Italy, Netherlands, Norway, Portugal, Turkey
1969	Canada, Italy, Japan, Taiwan, U.K.
1970	Argentina, Iran
1971	FRG, Korea
1972	FRG, Korea, Taiwan, Turkey
1973	FRG, Italy, Korea, Taiwan
1974	Italy, Philippines
1975	Belgium, Denmark, France, FRG, Netherlands, Norway, Switzerland, U.K.
1977	Belgium, Denmark, FRG, Italy, Japan, Netherlands, Norway
1978	France, FRG, Italy, Japan, Norway, U.K.

Note: FRG = Federal Republic of Germany;
UK = United Kingdom

Appendix G

Index of Revolution, Coup d'Etat or Social Unrest by Country With Offset Agreement--Alphabetical In Chronological Order

1. Argentina

- 1951 - Violence attending closure of La Prensa
- Unsuccessful coup against Peron
- 1953 - Rioting to support Peron government
- 1955 - Unsuccessful naval revolt
- Peron overthrown by military revolt
- Bloodless coup by military general
- 1956 - Abortive Peronista Uprising
- 1958 - Sporadic Peronista disorders
- 1960 - Abortive Peronista insurrection
- Abortive revolt by nationalist officers
- 1962 - Bloodless coup deposing Frondizi
- Mutinies over army control
- 1963 - Unsuccessful revolt by anti-Peron generals
- 1964 - Disorders before Peron return attempt
- 1971 - Peronista terrorism
- 1973-75 - General lawlessness and right-wing terrorism
- 1976 - Military coup

2. Australia

- 1978 - Aborigines land rights bombings

3. Belgium

- 1950 - Riots and strikes
- 1960 - Austerity strikes
- 1968-70 - Cultural language conflicts between Flemish and Walloons
- 1978 - Flemish-Walloon linguistic tensions

4. Canada

- 1967 - Revolution in Quebec (Ongoing to 1977)
- 1976 - Free Quebec terrorism
- 1978 - Quebec separatist movement

Appendix G (Continued)

5. Denmark - None listed6. France

- 1952 - Paris Riots
- 1968 - French Student Revolution
- 1971 - Breton separatists bombings
- 1974 - Political extremism and labor and racial tensions among Algerians
- 1975-76 - Corsican separatists bombings
- 1978 - Breton and Corsican separatists bombings

7. Germany, Federal Republic

- 1968 - Widespread student demonstrations
- 1974 - Labor and racial tensions among Turkish workers

8. Greece

- 1967 - Military coup topples monarchy
- 1973 - Military coup establishes dictatorship
- 1974 - Dictatorship returns government to civilian control following Cyprus debacle

9. India

- 1950 - Communal rioting
- 1951 - Food riots
- 1955 - Naga rebellion
 - Invasion of Goa
 - Communist riots
- 1958 - Kerala uprisings
- 1959 - Longju-Ladakh incidents with China
 - Food riots
- 1960 - Language riot
- 1961 - Communal riots
 - Invasion and liberation of Goa
- 1962 - Himalayan Border crisis with China
- 1964 - Communal riots
- 1971 - Communist terrorism and assassinations (localized)
- 1975 - Communal violence
- 1978 - Communal disturbances

Appendix G (Continued)

10. Iran

- 1951 - Riots in conjunction with oil industry nationalization
- 1953 - Royalist revolt and coup
- 1963 - Riots against reform program
- 1971 - Urban guerilla terrorism and assassinations
- 1973-76 - Increasing urban terrorism by Moslim militants
- 1978 - Widespread uprisings
- 1979 - Shah into exile

11. Italy

- 1950 - Strikes and demonstrations
- 1953 - Border conflict with Yugoslavia
- 1971 - Labor strikes and riots (localized)
- 1974 - Right wing violence and resurgence of fascist groups
- 1975-78 - Widespread political violence culminating in Moro kidnapping and killing

12. Japan

- 1952 - Uprising
- 1960 - Antigovernment riots in protest against military pacts with U.S.
- 1978 - Protests over opening of new Tokyo Airport

13. Korea

- 1950 - War between North and South Korea
- 1960 - Riots following re-election of Rhee
- 1961 - Military coup
- 1973 - Widespread political demonstrations
- 1978 - Student demonstrations

14. Netherlands

- 1975-78 - South Moluccan terrorist incidents

Appendix G (Continued)

15. Norway - None listed16. Philippines

- 1970 - Antigovernment demonstrations and general strike
- 1971-78 - Moro Muslim insurgency
- 1978 - Communist uprisings

17. Portugal

- 1961 - Santa Maria incident
- Angola revolt
- 1962 - Abortive military revolt
- 1973 - Revolutionary terrorism
- 1974 - Military coup
- 1975 - Abortive communist coup

18. Spain

- 1955 - Strikes
- 1957 - Morocco attack on Spanish Sahara (IFNI)
- 1966-68 - Strikes, student unrest and police repression
- 1971 - Repression of Basque nationalism
- 1973 - Basque and Catalan terrorism
- 1974 - Widespread labor disorders
- 1978 - Political violence and Basque terrorism

19. Switzerland - None listed20. Taiwan

- 1954 - Quemoy-Matsu-Tachen Islands-Nanchi shelling
- 1957 - Anti-American riots in Tai Peh
- 1958 - Quemoy crisis

Appendix G (Continued)

21. Turkey

- 1960 - Civil disorders and military coup
- 1960-64 - Revolution
- 1971 - Student riots and political kidnappings
- 1972-74 - Martial law to suppress revolution
- 1975-78 - Bloody student uprisings; terrorism widespread

22. United Kingdom

- 1957 - IRA terrorist campaign
- 1969 - Riots in Northern Ireland
- 1971 - Welsh nationalist violence (localized)
- 1971-76 - Violence in Northern Ireland
- 1978 - IRA bombing campaigns in England and Northern Ireland

23. United States

- 1954-1971 - Black revolution
- 1962-1971 - Revolution of the New Left
- 1962-1971 - Student rebellions
- 1964-? - Women's Liberation Movement

Sources: Robert Blackey, Modern Revolutions and Revolutionists: A Bibliography [Santa Barbara, CA: Clio Books, 1976], pp. xv-xiv.

Gerry M. Smith, Flashpoints: A Bibliography on Political Conflicts Throughout the World, Hartlepool, Cleveland, U.K.: Headland Press, 1979.

R. P. Richardson, Jr., et al., An Analysis of Recent Conflicts. Center for Naval Analysis Research Contribution No. 144 [Rochester, N.Y.: Institute for Naval Analysis, 1966], pp. B-293-B-304.

Brian Crozier, ed., Annual of Power and Conflict. London: Institute for the Study of Conflict, 1971-1979.

Appendix H

Offset Data Sheets

No.	Country	Project	Year	Variables																
		Fixed Wing Aircraft		1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18
1.	Japan	Beech T-34	1953	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	-1	1
2.	Canada	C52F-1 Aircraft	1954	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	-1	1
3.	Japan	F-86F	1955	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	-1	1
4.	Italy	C-119 Transport	1955	1	1	-1	1	1	1	1	1	1	1	-1	1	1	0	1	-1	1
5.	Japan	T-33 Trainer	1955	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	0	1	-1	1
6.	Japan	L-19 Observation	1956	1	-1	-1	1	1	1	1	1	1	1	-1	-1	1	0	1	-1	1
7.	Japan	P2V-7 ASW	1958	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	1	1
8.	Argentina	T-34 Trainer	1959	-1	1	-1	1	1	1	1	1	1	1	-1	-1	1	0	1	-1	1
9.	Canada	C-52F ASW	1959	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	0	1
10.	Japan	F-104J	1959	1	1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	1	1
11.	Belgium	F-104G-A	1960	-1	1	-1	1	1	1	1	1	1	1	-1	1	1	1	-1	1	1
12.	FRG	F-104G-B	1960	1	1	-1	1	1	1	1	1	1	1	-1	1	1	1	1	1	1
13.	Italy	F-104G-C	1960	1	1	-1	1	1	1	1	1	1	1	-1	1	1	0	-1	1	1
14.	Netherlands	F-104G-D	1960	1	1	-1	1	1	1	1	1	1	1	-1	1	1	1	1	1	1
15.	Canada	CF-104	1960	1	1	-1	1	1	1	1	1	1	1	-1	1	1	1	1	1	1
16.	U.K.	P-1127 VTOL (Kestrel)	1960	0	1	-1	1	1	1	1	1	1	1	-1	1	1	1	1	-1	1
17.	Canada	CV-7A Buffalo	1962	-1	-1	-1	1	1	1	1	1	1	1	-1	1	1	1	1	1	1
18.	Argentina	Cessna, 182	1965	1	-1	-1	1	1	1	1	1	1	-1	-1	-1	1	1	1	-1	1
19.	Canada	CF-5	1965	1	1	-1	1	1	1	1	1	1	1	-1	1	1	1	1	1	1

NOTES:

11, 13, 14 Aircraft from FRG production
 16 U.K. primary provider
 17 Canada provider

Appendix H (Continued)

No.	Country	Project	Year	Variables																
		Fixed Wing Aircraft		1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18
20.	Italy	F-104S	1965	1	1	-1	1	1	1	1	1	1	-1	0	-1	1	0	-1	1	1
21.	Spain	F-5	1965	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	0	1	-1	1
22.	U.K.	F-4	1965	1	-1	-1	1	-1	1	1	1	1	-1	1	1	1	1	1	1	1
23.	Netherlands	MF-5	1967	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	-1	1	1
24.	FRG	RF-4	1968	-1	1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
25.	Japan	F-4 Parts	1969	1	-1	-1	1	-1	1	1	1	1	1	-1	1	1	1	1	-1	1
26.	U.K.	Karrier VSTOL	1969	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27.	FRG	F-4F	1971	1	1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
28.	Taiwan	F-5E	1972	1	1	-1	1	1	1	1	1	1	1	1	-1	1	1	1	1	1
29.	Belgium	F-16 - A	1975	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30.	Denmark	F-16 - B	1975	1	1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1
31.	Netherlands	F-16 - C	1975	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32.	Norway	F-16 - D	1975	1	1	-1	1	1	1	1	1	-1	1	1	1	0	1	1	1	1
33.	Switzerland	F-5E/F	1975	1	1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	-1	1
34.	Japan	F-4J	1977	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35.	Japan	F-15J	1978	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
36.	Japan	P3C ASW	1978	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
37.	France	CT-20 Drone	1958	-1	-1	-1	1	-1	-1	1	1	-1	-1	1	1	1	1	1	-1	-1
38.	France	Atlantique - A	1958	-1	1	-1	1	-1	1	1	1	-1	-1	1	1	1	1	1	1	-1

NOTES:

- 23 From Canadian production
- 33 No defense or mutual security treaties
- 37 France provider; implemented unilaterally by France
- 38 French design; implemented by European consortium

Appendix H (Continued)

No.	Country	Project	Year	Variables														
				1	2	3	4	5	6	7	8	9	10	11	13	16	17	18
		Fixed Wing Aircraft																
39.	FRG	Atlantique - B	1958	1	1	-1	-1	1	1	1	1	1	-1	1	1	1	1	-1
40.	Netherlands	Atlantique - C	1958	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	1	-1
41.	Belgium	Atlantique - D	1958	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	-1
42.	France	CT-41 Drone	1960	-1	-1	-1	1	-1	-1	1	1	-1	-1	1	1	1	1	-1
43.	FRG	VSTOL Fighter R&D	1960	-1	-1	-1	-1	1	1	1	1	1	-1	-1	1	1	1	-1
44.	France	Mirage III-V	1963	-1	1	-1	1	-1	-1	1	1	-1	-1	1	1	1	1	-1
45.	France	Breguet 941 Stor	1965	-1	1	-1	1	-1	-1	1	1	-1	-1	1	1	1	1	-1
46.	U.K.	C-130	1965	1	-1	-1	1	-1	-1	1	1	1	-1	1	1	1	1	-1
47.	Canada	F-15	1966	1	1	-1	0	1	-1	1	1	1	-1	1	1	1	1	-1
48.	Canada	C-5 - A	1966	1	-1	-1	-1	-1	-1	1	1	1	-1	0	1	1	1	-1
49.	U.K.	C-5 - B	1966	1	-1	-1	1	-1	-1	1	1	1	-1	0	1	1	1	-1
50.	Canada	F-111 - A	1966	1	1	-1	1	1	-1	1	1	1	-1	1	1	1	1	-1
51.	U.K.	F-111 - B	1966	1	1	-1	1	-1	-1	1	1	1	-1	1	1	1	1	-1

NOTES:

- 39 France provider
- 40 France provider
- 41 France provider
- 42 France provider; built unilaterally by France
- 43 FRG provider
- 44 France provider
- 45 France provider

Appendix H (Continued)

No. Country	Project	Year	Variables																	
	Rotary Aircraft		1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	
52. Italy	Bell 47	1957	1	-1	-1	1	1	1	1	1	1	1	-1	-1	1	1	1	-1	1	
53. Japan	Bell 47	1953	1	-1	-1	1	1	1	1	1	1	1	-1	-1	1	0	1	-1	1	
54. U.K.	Sikorsky S-51	1956	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
55. U.K.	S-55	1956	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
56. U.K.	S-58	1956	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
57. France	Alouette II	1958	-1	-1	-1	-1	1	1	1	1	1	1	-1	-1	1	1	1	-1	1	
58. Japan	S-55	1958	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
59. FRG	S-54	1959	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
60. FRG	S-54	1959	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
61. U.K.	S-61/SH-30	1959	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
62. France	S-58	1960	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	-1	1	
63. India	S-62	1960	-1	1	-1	1	1	1	1	1	1	1	-1	-1	0	0	1	-1	1	
64. Italy	Bell 204	1960	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
65. Japan	Bell 204	1960	-1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
66. Japan	Boeing-Vertol 107	1960	-1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
67. Japan	S-61	1960	-1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
68. Japan	S-62	1960	-1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
69. Italy	Bell 205	1963	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
70. FRG	Bell UH-10	1965	1	-1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	-1	1	

NOTES: 57 France provider

Appendix H (Continued)

No.	Country	Project	Year	Variables																	
				1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	
Rotary Aircraft																					
71.	FRG	CH-53	1968	-1	-1	-1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
72.	Italy	CH-47C	1968	1	-1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
73.	Canada	CH-53	1969	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	
74.	Italy	Bell 212	1969	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
75.	Italy	Hughes 369	1969	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	
76.	Taiwan	Bell UH-1H	1969	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	
77.	Italy	Agusta A-101	1959	-1	-1	-1	-1	1	1	1	1	-1	-1	1	1	1	1	1	-1	-1	
Tanks & S.P. Guns																					
78.	Canada	M-72 LAW AT-A	1964	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
79.	Norway	M-72 LAW AT-B	1964	1	1	-1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	
80.	Italy	M-60 - A1	1964	1	1	-1	1	1	1	0	1	1	-1	1	-1	1	1	1	1	1	
81.	Netherlands	109 MM S.P. How-A	1966	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
82.	Norway	109 MM S.P. How-B	1966	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
83.	Italy	109 MM S.P. Howitzer	1968	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
84.	Iran	M-47 Tank Retrofit	1970	1	1	-1	1	1	1	0	1	1	1	0	-1	0	0	1	1	1	
85.	FRG	MBT-70	1963	1	1	-1	1	-1	1	1	1	1	-1	1	1	1	1	1	1	-1	

NOTES:

- 77 Implemented unilaterally by Italy
- 85 This project failed because FRG won initial competition by cheating on design specifications. Production models could never meet design specifications and the contract went back into competition and eventually fell through.

Appendix H (Continued)

No. Country	Project Vehicles	Year	Variables																	
			1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	
86. Italy	M-113 APC	1963	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1	
87. FRG	HEI-70	1965	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
88. Taiwan	General Purpose	1966	1	-1	-1	1	1	1	1	1	1	-1	0	-1	1	1	1	-1	1	
89. France	EMISS - A	1975	1	-1	-1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1	
90. FRG	EMISS - B	1975	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
91. Netherlands	EMISS - C	1975	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
92. U.K.	EMISS - D	1975	0	-1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
93. Canada	XM-571 Tracked	UKN	0	0	-1	1	1	-1	1	1	1	0	1	1	1	1	1	0	-1	
Handheld Weapons																				
94. Belgium	Rocket Launcher	1963	1	-1	-1	1	0	1	0	1	1	-1	1	1	1	1	1	1	1	
95. Taiwan	M-14, M-60, 7.62 Ammo	1967	0	0	-1	1	1	1	1	1	1	-1	0	-1	1	1	1	-1	1	
96. Korea	M-16 Rifle	1971	1	-1	-1	1	-1	1	1	1	1	1	1	-1	1	0	1	1	1	
97. Korea	Ammunition	1972	1	-1	-1	1	-1	1	1	1	1	1	0	-1	1	0	-1	1	1	
98. Turkey	2.75 FF Rockets	1972	-1	1	-1	1	1	1	1	1	1	1	0	-1	1	0	1	1	1	
99. Philippines	M-16 Rifle	1974	-1	1	-1	1	1	1	1	1	1	1	1	-1	1	0	1	-1	1	

Appendix H (Continued)

No.	Country	Project Missiles	Year	Variables																
				1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18
100.	Belgium	AIM-7 - A	1959	1	1	-1	1	1	1	0	1	1	-1	1	1	1	1	1	1	1
101.	Canada	AIM-7 - B	1959	1	1	-1	1	1	1	0	1	1	-1	1	1	1	1	1	1	1
102.	FRG	AIM-7 - C	1959	1	1	-1	1	1	1	0	1	1	-1	1	1	1	1	1	1	1
103.	Italy	AIM-7 - D	1959	1	1	-1	1	1	1	0	1	1	-1	1	-1	1	1	1	1	1
104.	Netherlands	AIM-7 - E	1959	1	1	-1	1	1	1	0	1	1	-1	1	-1	1	0	1	1	1
105.	Belgium	Hawk - A	1960	-1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
106.	France	Hawk - B	1960	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
107.	FRG	Hawk - C	1960	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
108.	Italy	Hawk - D	1960	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1
109.	Netherlands	Hawk - E	1960	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
110.	U.K.	Polaris	1960	1	1	-1	1	1	1	-1	1	1	-1	1	1	1	1	1	1	1
111.	Denmark	Bullpup - A	1962	1	1	-1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1
112.	Norway	Bullpup - B	1962	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
113.	Turkey	Bullpup - C	1962	-1	1	-1	1	1	1	1	1	1	-1	1	-1	0	0	1	1	1
114.	U.K.	Bullpup - D	1962	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
115.	Japan	Hawk	1967	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1
116.	Japan	Nike Hercules	1967	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1
117.	Belgium	Hawk - AA	1968	-1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1
118.	Denmark	Hawk - BB	1968	1	1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1

NOTES: 117-122 Improved Hawk

Appendix H (Continued)

No.	Country	Project	Year	Variables																
				1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18
		Missiles																		
119.	France	Hawk - CC	1968	-1	1	-1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1
120.	Greece	Hawk - DD	1968	0	1	-1	1	1	1	1	1	1	1	-1	0	0	1	1	1	1
121.	Italy	Hawk - EE	1968	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
122.	Netherlands	Hawk - FF	1968	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
123.	Belgium	Sidewinder - A	1968	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
124.	FRG	Sidewinder - B	1968	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125.	Greece	Sidewinder - C	1968	0	1	-1	1	1	1	1	1	1	1	1	-1	0	0	1	1	1
126.	Netherlands	Sidewinder - D	1968	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
127.	Norway	Sidewinder - E	1968	1	1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1
128.	Portugal	Sidewinder - F	1968	0	1	-1	1	1	1	1	1	-1	1	1	-1	0	0	1	0	1
129.	Turkey	Sidewinder - G	1968	1	1	-1	1	1	1	1	1	1	1	1	-1	0	0	1	1	1
130.	Belgium	Sea Sparrow - A	1968	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
131.	Denmark	Sea Sparrow - B	1968	1	1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1
132.	FRG	Sea Sparrow - C	1968	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
133.	Italy	Sea Sparrow - D	1968	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
134.	Netherlands	Sea Sparrow - E	1968	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
135.	Norway	Sea Sparrow - F	1968	1	1	-1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1
136.	Italy	AIM-9 Sidewinder	1974	-1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
137.	France	Roland - A	1975	1	-1	-1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1

NOTES: 117-122 Improved Hawk

Appendix H (Continued)

No.	Country	Project	Year	Variables																
				1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18
Missiles																				
138.	FRC	Roland - B	1975	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
139.	Japan	AIM-7 Sparrow	1977	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
140.	Japan	Hawk Improved	1977	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
141.	Belgium	Sea Sparrow - AA	1977	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
142.	Denmark	Sea Sparrow - BB	1977	1	-1	-1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1
143.	FRC	Sea Sparrow - CC	1977	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
144.	Italy	Sea Sparrow - DD	1977	-1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
145.	Netherlands	Sea Sparrow - EE	1977	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
146.	Norway	Sea Sparrow - FF	1977	1	-1	-1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1
147.	U.K.	Copperhead	1977	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
148.	U.K.	Harpoon	1977	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
149.	FRC	AIM-9L - A	1978	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
150.	Italy	AIM-9L - B	1978	-1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
151.	Norway	AIM-9L - C	1978	1	-1	-1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1
152.	U.K.	AIM-9L - D	1978	-1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
153.	U.K.	Skybolt	1959	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	-1

NOTES: 141-146 Improved Sea Sparrow

Appendix H (Continued)

No.	Country	Project	Year	Variables																	
		Ships		1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	
154.	Norway	Frigate	1960	1	1	-1	1	1	1	1	1	-1	-1	0	1	1	1	1	1	1	
155.	Spain	Destroyer Escort Group	1964	-1	1	-1	1	1	1	1	1	1	-1	0	-1	0	0	1	0	1	
156.	Italy	Swordfish Patrol	1965	1	0	-1	1	1	1	0	1	1	-1	0	-1	1	1	1	0	1	
157.	Norway	Guided Missile Frigate	1975	1	1	-1	1	1	1	1	1	-1	1	0	1	1	1	1	1	1	
158.	FRG	Patrol Hydrofoil - A	1973	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1	
159.	Italy	Patrol Hydrofoil - B	1973	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1	
Miscellaneous																					
160.	France	TF-30/TF-306 & Engine	1959	1	-1	-1	1	-1	1	1	1	1	-1	1	1	1	1	1	1	1	
161.	Canada	MK-44 Torpedo - A	1950s	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
162.	France	MK-44 Torpedo - B	1950s	0	-1	-1	1	-1	1	1	1	1	-1	1	0	1	0	1	1	1	
163.	Italy	MK-44 Torpedo - C	1950s	0	1	-1	1	1	1	1	1	1	-1	1	-1	0	0	1	1	1	
164.	Canada	J-79 Engine	1960	1	1	-1	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	
165.	France	L-102 Autopilot	1960	1	-1	-1	1	-1	1	1	1	1	-1	0	-1	1	0	1	0	1	
166.	Japan	ADCCS	1967	1	-1	-1	-1	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	
167.	U.K.	Bery Urum Engines	1960s	0	-1	-1	1	-1	1	1	1	1	0	-1	1	1	1	1	-1	1	
168.	FRG	Adv. Flt. Cntrl. Tech.	1972	1	1	-1	1	-1	1	1	1	1	1	-1	1	1	1	1	-1	1	
169.	FRG	Cartography Tech.	1972	1	1	-1	1	-1	1	1	1	1	1	-1	1	1	1	1	-1	1	
170.	FRG	Remotely Piloted Veh.	1972	1	1	-1	1	-1	1	1	1	1	1	-1	1	1	1	1	-1	1	

NOTES:

161-163 Unable to verify year

166 Air Defense Command & Control System

167 Unable to verify year

Appendix H (Continued)

No.	Country	Project	Year	Variables																
				1	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18
		Miscellaneous																		
171.	Korea	AN/PRC-77 Radio	1973	-1	0	-1	1	0	1	1	1	1	1	0	-1	0	0	1	1	1
172.	Italy	ARGUS 10 Radar	1974	-1	-1	-1	1	-1	1	1	1	1	1	0	1	1	1	1	0	1
173.	FRG	SLAR (UPD-X)	1975	1	-1	-1	1	-1	1	1	1	1	1	0	1	1	1	1	0	1
174.	FRG	MOD FLIR	1978	1	-1	1	1	-1	1	1	1	1	1	-1	1	1	1	1	-1	1
175.	France	MLRS - A	1978	1	-1	-1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1
176.	FRG	MLRS - B	1978	1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
177.	U.K.	MLRS - C	1978	-1	-1	-1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1
178.	Canada	ACLS	1970s	0	1	-1	1	-1	1	1	1	1	1	-1	1	1	1	1	-1	1
179.	Australia	General - A	1960	1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	1	0	1	-1	-1
180.	Belgium	General - B	1960	-1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	1	0	1	0	-1
181.	Denmark	General - C	1960	1	-1	-1	-1	-1	-1	0	1	1	-1	-1	0	1	0	1	0	-1
182.	France	General - D	1960	1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	1	0	1	0	-1
183.	FRG	General - E	1960	1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	1	0	1	0	-1
184.	Italy	General - F	1960	1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	-1	0	1	0	-1
185.	Netherlands	General - G	1960	1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	1	0	1	0	-1
186.	Norway	General - H	1960	1	-1	-1	-1	-1	-1	0	1	1	1	-1	0	1	0	1	0	-1
187.	Portugal	General - I	1960	0	0	-1	-1	-1	-1	0	1	1	-1	-1	0	-1	0	1	0	-1
188.	Turkey	General - J	1960	-1	0	-1	-1	-1	-1	0	1	1	1	-1	-1	0	0	1	0	-1
189.	Argentina	General	1970	-1	0	-1	-1	-1	-1	0	1	1	-1	1	0	-1	0	1	0	-1
190.	FRG	General - A	1978	1	-1	-1	-1	-1	-1	0	1	1	1	1	0	1	0	1	0	-1
191.	Norway	General - B	1978	1	-1	-1	-1	-1	-1	0	1	1	-1	1	0	1	0	1	0	-1

NOTES:

173 Side looking airborne radar

174 Modified Forward Looking Infra-red

175-177 Multiple Launch Rocket System

178 Air Cushion Landing System; unable to verify year

Appendix I
Stability Data Sheets

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
		Fixed Wing Aircraft										
1.	Japan	Beech T-34	1953	1	1	1	1	1	1	1	1	1
2.	Canada	CS2F-1 Aircraft	1954	1	1	1	1	1	1	1	1	1
3.	Japan	F-86F	1955	1	1	1	1	1	1	1	1	1
4.	Italy	G-119 Transport	1955	1	1	1	1	1	1	1	1	0
5.	Japan	T-33 Trainer	1955	1	1	1	1	1	1	1	1	1
6.	Japan	L-19 Observation	1956	1	1	1	1	1	1	1	1	1
7.	Japan	P2V-7 ASW	1958	1	1	1	1	1	1	1	1	1
8.	Argentina	T-34 Trainer	1959	1	1	-1	-1	1	1	1	-1	-1
9.	Canada	G-52F ASW	1959	1	1	1	0	1	1	1	1	1
10.	Japan	F-104 J	1959	1	1	1	1	1	1	1	1	1
11.	Belgium	F-104 G	1960	1	1	-1	-1	1	1	1	1	1
12.	FRG	F-104 G	1960	1	1	1	1	1	1	1	1	1
13.	Italy	F-104 G	1960	1	1	1	1	1	1	1	1	0
14.	Netherlands	F-104 G	1960	1	1	1	1	1	1	1	1	1
15.	Canada	CF-104	1960	1	1	1	1	1	1	1	1	1
16.	U.S.	P-1127 VTOL (Kestrel)	1960	1	1	0	0	0	0	0	1	1
17.	U.S.	CV-7A Buffalo	1962	1	1	-1	-1	0	0	0	-1	1
18.	Argentina	Cessna 182	1965	1	1	1	0	1	1	1	0	0
19.	Canada	CF-5	1965	1	1	1	1	1	1	1	1	1

NOTES: * Essential to national stability

16 U.K. provider

17 Canada provider

Appendix I (Continued)

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
		Fixed Wing Aircraft										
20.	Italy	F-104S	1965	1	1	1	1	1	1	1	0	0
21.	Spain	F-5	1965	1	1	0	0	1	1	1	1	1
22.	U.K.	F-4	1965	1	1	1	1	1	1	1	1	1
23.	Netherlands	NF-5	1967	1	1	1	1	1	1	1	1	1
24.	FRG	RF-4	1968	1	1	-1	-1	1	0	1	0	0
25.	Japan	F-4 Parts	1969	1	1	1	1	1	1	1	1	1
26.	U.S.	Carrier VSTOL	1969	1	1	-1	-1	1	0	0	-1	1
27.	FRG	F-4F	1971	1	1	1	1	1	1	1	1	1
28.	Taiwan	F-5E	1972	1	1	0	0	1	0	1	1	1
29.	Belgium	F-16 - A	1975	1	1	1	-1	1	1	1	1	1
30.	Denmark	F-16 - B	1975	1	1	1	1	1	1	1	1	1
31.	Netherlands	F-16 - C	1975	1	1	1	-1	1	1	1	0	1
32.	Norway	F-16 - D	1975	1	1	1	1	1	1	1	1	1
33.	Switzerland	F-5E1E	1975	1	1	1	-1	1	1	1	1	1
34.	Japan	F-4J	1977	1	1	1	0	1	1	1	1	1
35.	Japan	F-15J	1978	1	1	1	-1	1	1	1	0	1
36.	Japan	F3C ASW	1978	1	1	1	-1	1	1	1	0	1
37.	U.S.	CT-20 Drone	1958	1	1	-1	-1	-1	-1	0	-1	1
38.	U.S.	Atlantique - A	1958	1	1	-1	-1	-1	-1	0	-1	1

NOTES:

* Essential to national stability

26 U.K. provider

37 France provider

38 France provider

Appendix I (Continued)

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
		Fixed Wing Aircraft										
39.	FRG	Atlantique - B	1958	1	1	1	1	1	1	1	1	1
40.	Netherlands	Atlantique - C	1958	1	1	1	1	1	1	1	1	1
41.	Belgium	Atlantique - D	1958	1	1	1	-1	1	1	1	1	1
42.	U.S.	CT-41 Drone	1960	1	1	-1	-1	-1	-1	0	-1	1
43.	U.S.	VSTOL Fighter R&D	1960	1	1	-1	-1	-1	-1	0	-1	1
44.	U.S.	Mirage III-V	1963	1	1	-1	-1	-1	-1	0	-1	1
45.	U.S.	Brequet 941 STOL	1965	1	1	-1	-1	0	-1	0	0	1
46.	U.K.	C-130	1965	1	1	0	-1	1	1	1	1	1
47.	Canada	F-15	1966	1	1	0	-1	1	0	1	1	1
48.	Canada	C-5 - A	1966	1	1	0	-1	1	1	1	1	0
49.	U.K.	C-5 - B	1966	1	1	0	-1	1	1	1	1	1
50.	Canada	F-111 - A	1966	1	1	0	-1	1	1	1	1	0
51.	U.K.	F-111 - B	1966	1	1	0	-1	1	1	1	1	1

NOTES: * Essential to national stability

39-42 France provider

43 FRG provider

44 France provider

45 France provider

Appendix I (Continued)

No.	Country	Project	Year	Variables									
				1	2	3*	4	5*	6	7*	8	9	
		Rotary Aircraft											
52.	Italy	Bell 47	1952	1	1	1	0	1	1	1	1	1	1
53.	Japan	Bell 47	1953	1	1	1	0	1	1	1	1	1	1
54.	U.K.	Sikorsky S-51	1956	1	1	1	1	1	1	1	1	1	1
55.	U.K.	S-55	1956	1	1	1	1	1	1	1	1	1	1
56.	U.K.	S-58	1956	1	1	1	1	1	1	1	1	1	1
57.	U.S.	Alouette II	1958	1	1	-1	-1	0	0	0	1	1	1
58.	Japan	S-55	1958	1	1	1	1	1	1	1	1	1	1
59.	FRG	S-54	1959	1	1	1	1	1	1	1	1	1	1
60.	FRG	S-58	1959	1	1	1	1	1	1	1	1	1	1
61.	U.K.	S-61/SH-30	1959	1	1	1	0	1	1	1	1	1	1
62.	France	S-58	1960	1	1	1	0	0	1	1	1	1	1
63.	India	S-62	1960	0	1	-1	-1	1	1	1	0	1	1
64.	Italy	Bell 204	1960	1	1	1	0	1	1	1	0	1	1
65.	Japan	Bell 204	1960	1	1	-1	-1	1	1	1	0	1	1
66.	Japan	Boeing-Vertol 107	1960	1	1	-1	-1	1	1	1	0	1	1
67.	Japan	S-61	1960	1	1	-1	-1	1	1	1	0	1	1
68.	Japan	S-62	1960	1	1	-1	-1	1	1	1	0	1	1
69.	Italy	Bell 205	1963	1	1	1	1	1	1	1	0	1	1
70.	FRG	Bell UH-1D	1965	1	1	1	1	1	1	1	1	1	1

NOTES:

*

Essential to national stability

57 France provider

Appendix I (Continued)

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
Rotary Aircraft												
71.	FRC	CH-53	1968	1	1	-1	-1	1	1	1	-1	1
72.	Italy	CH-47C	1968	1	1	1	1	1	1	1	0	1
73.	Canada	CH-53	1969	0	1	-1	-1	1	1	1	0	1
74.	Italy	Bell 217	1969	1	1	1	1	1	1	1	0	1
75.	Italy	Hughes 369	1969	1	1	1	1	1	1	1	0	1
76.	Taiwan	Bell UH-1H	1969	1	1	1	1	1	1	1	1	1
77.	U.S.	Augusta A-101	1959	1	1	-1	-1	-1	-1	-1	0	1
Tanks & S.P. Guns												
78.	Canada	M-72 LAW AT-A	1964	1	1	1	1	1	1	1	1	1
79.	Norway	M-72 LAW AT-B	1964	1	1	1	1	1	1	1	1	1
80.	Italy	M-60-A1	1964	1	1	1	1	1	1	1	1	1
81.	Netherlands	109 MM S.P. How-A	1966	1	1	1	1	1	1	1	1	1
82.	Norway	109 MM S.P. How-B	1966	1	1	1	1	1	1	1	1	1
83.	Italy	109 MM S.P. Howitzer	1968	1	1	1	1	1	1	1	0	1
84.	Iran	M-47 Tank Retrofit	1970	1	1	1	0	1	1	1	0	1
85.	FRC	MBT-70	1963	1	1	1	1	1	1	1	1	1

NOTES:

* Essential to national stability

77 Italy provider

Appendix I (Continued)

No.	Country	Project Vehicles	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
86.	Italy	M-113 APC	1963	1	1	1	1	1	1	1	0	1
87.	FRG	HET-70	1965	1	1	1	1	1	1	1	1	1
88.	Taiwan	General Purpose	1966	0	1	1	0	1	1	0	1	1
89.	France	EMISS - A	1975	1	1	1	-1	1	1	1	0	1
90.	FRG	EMISS - B	1975	1	1	1	0	1	1	1	1	1
91.	Netherlands	EMISS - C	1975	1	1	1	-1	1	1	1	1	1
92.	U.K.	EMISS - D	1975	0	1	0	-1	1	1	1	0	0
93.	Canada	XM-571 Tracked	UKN	0	1	0	0	1	1	0	0	0
Handheld Weapons												
94.	Belgium	Rocket Launcher	1963	1	1	1	0	1	1	1	0	1
95.	Taiwan	M-14, M-60, 7.62 Ammo	1967	0	1	0	0	1	1	0	0	1
96.	Korea	M-16	1971	1	1	1	1	0	1	1	0	1
97.	Korea	Ammunition	1972	1	1	1	1	0	1	1	0	1
98.	Turkey	2.75 FF Rockets	1972	1	1	-1	-1	1	0	1	-1	0
99.	Philippines	M-16 Rifle	1974	1	1	-1	-1	0	0	0	0	1

NOTES:

- * Essential to national stability
 91 Netherlands experienced terrorism from South
 Moluccans which didn't concern internal stability
 92 Labor unrest and No. Ireland terrorism

Appendix I (Continued)

No.	Country	Project Missiles	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
100.	Belgium	AIM-7 - A	1959	1	1	1	-1	1	1	1	0	1
101.	Canada	AIM-7 - B	1959	1	1	1	0	1	1	1	1	1
102.	FRG	AIM-7 - C	1959	1	1	1	1	1	1	1	1	1
103.	Italy	AIM-7 - D	1959	1	1	1	1	1	1	1	0	1
104.	Netherlands	AIM-7 - E	1959	1	1	1	1	1	1	1	1	1
105.	Belgium	Hawk - A	1960	1	1	-1	-1	-1	-1	1	0	1
106.	France	Hawk - B	1960	1	1	1	0	1	1	1	0	1
107.	FRG	Hawk - C	1960	1	1	1	1	1	1	1	1	1
108.	Italy	Hawk - D	1960	1	1	1	0	1	1	1	0	1
109.	Netherlands	Hawk - E	1960	1	1	1	1	1	1	1	1	1
110.	U.K.	Polaris	1960	1	1	1	1	1	1	1	1	1
111.	Denmark	Bullpup - A	1962	1	1	1	1	1	1	1	1	1
112.	Norway	Bullpup - B	1962	1	1	1	1	1	1	1	1	1
113.	Turkey	Bullpup - C	1962	1	1	-1	-1	-1	0	1	-1	0
114.	U.K.	Bullpup - D	1962	1	1	1	1	1	1	1	1	1
115.	Japan	Hawk	1967	1	1	1	1	1	1	1	1	1
116.	Japan	Nike Hercules	1967	1	1	1	1	1	1	1	1	1
117.	Belgium	Hawk - AA	1968	1	1	-1	-1	1	1	1	0	1
118.	Denmark	Hawk - AA	1968	1	1	1	1	1	1	1	1	1

NOTES: * Essential to national stability

Appendix I (Continued)

No.	Country	Project Missiles	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
119.	France	Hawk - CC	1968	1	1	-1	-1	0	-1	1	0	1
120.	Greece	Hawk - DD	1968	1	0	0	0	0	0	1	0	1
121.	Italy	Hawk - EE	1968	1	1	1	0	1	1	1	0	1
122.	Netherlands	Hawk - FF	1968	1	1	1	1	1	1	1	1	1
123.	Belgium	Sidewinder - A	1968	1	1	-1	-1	1	1	1	0	1
124.	FRG	Sidewinder - B	1968	1	1	-1	-1	-1	-1	1	0	1
125.	Greece	Sidewinder - C	1968	1	0	0	0	0	0	1	0	1
126.	Netherlands	Sidewinder - D	1968	1	1	1	1	1	1	1	1	1
127.	Norway	Sidewinder - E	1968	1	1	1	1	1	1	1	1	1
128.	Portugal	Sidewinder - F	1968	1	0	0	0	0	0	0	1	1
129.	Turkey	Sidewinder - G	1968	1	1	0	0	1	0	1	0	1
130.	Belgium	Sea Sparrow - A	1968	1	1	-1	-1	1	1	1	0	1
131.	Denmark	Sea Sparrow - B	1968	1	1	1	1	1	1	1	1	1
132.	FRG	Sea Sparrow - C	1968	1	1	-1	-1	-1	-1	1	0	1
133.	Italy	Sea Sparrow - D	1968	1	1	1	0	1	1	1	0	1
134.	Netherlands	Sea Sparrow - E	1968	1	1	1	1	1	1	1	1	1
135.	Norway	Sea Sparrow - F	1968	1	1	1	1	1	1	1	1	1
136.	Italy	AIM-9 Sidewinder	1974	1	1	-1	-1	-1	-1	1	0	1
137.	U.S.	Roland - A	1975	1	1	1	0	1	1	1	1	1

NOTES:
 * Essential to national stability
 137 France & Germany providers

Appendix I (Continued)

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
138.	U.S.	Roland - B	1975	1	1	1	0	1	1	1	1	1
139.	Japan	AIM-7 Sparrow	1977	1	1	1	1	1	1	1	1	1
140.	Japan	Hawk, Improved	1977	1	1	1	1	1	1	1	1	1
141.	Belgium	Sea Sparrow - AA	1977	1	1	1	-1	1	1	1	0	1
142.	Denmark	Sea Sparrow - BB	1977	1	1	1	1	1	1	1	1	1
143.	FRG	Sea Sparrow - CC	1977	1	1	1	1	1	1	1	1	1
144.	Italy	Sea Sparrow - DD	1977	1	1	-1	-1	0	1	1	0	1
145.	Netherlands	Sea Sparrow - EE	1977	1	1	1	-1	1	1	1	1	1
146.	Norway	Sea Sparrow - FF	1977	1	1	1	1	1	1	1	1	1
147.	U.K.	Copperhead	1977	0	1	1	0	1	1	1	0	1
148.	U.K.	Harpoon	1977	0	1	1	0	1	1	1	0	1
149.	FRG	AIM-9L - A	1978	1	1	1	1	1	1	1	1	1
150.	Italy	AIM-9L - B	1978	1	1	-1	-1	0	1	1	0	1
151.	Norway	AIM-9L - C	1978	1	1	1	1	1	1	1	1	1
152.	U.K.	AIM-9L - D	1978	0	1	-1	-1	1	1	1	0	1
153.	U.K.	Skybolt	1959	1	1	1	0	1	1	1	1	1

NOTES:

* Essential to national stability

138 France and Germany providers

Appendix I (Continued)

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
		Ships										
154.	Norway	Frigate	1960	1	1	1	1	1	1	1	1	1
155.	Spain	Destroyer Escort Group	1964	0	0	-1	-1	1	0	0	0	1
156.	Italy	Swordfish Patrol	1965	1	1	1	1	1	1	1	0	1
157.	Norway	Guided Missile Frigate	1975	1	1	1	1	1	1	1	1	1
158.	FRG	Patrol Hydrofoil - A	1973	1	1	1	1	1	1	1	1	1
159.	Italy	Patrol Hydrofoil - B	1973	1	1	1	0	1	1	1	1	1
Miscellaneous												
160.	France	TF-30/TF-306C Engine	1959	1	1	0	-1	1	1	1	0	0
161.	Canada	MK-44 Torpedo - A	1950s	1	1	1	0	1	1	1	1	1
162.	France	MK-44 Torpedo - B	1950s	1	1	0	0	0	0	0	0	1
163.	Italy	MK-44 Torpedo - C	1950s	1	1	0	0	0	0	0	0	1
164.	Canada	J-79 Engine	1960	1	1	1	1	1	1	1	1	1
165.	France	L-102 Autopilot	1960	1	1	1	0	1	1	1	0	1
166.	Japan	ADCCS	1967	1	1	1	1	1	1	1	1	1
167.	U.K.	Beryllium Engine	1960s	1	1	0	0	1	0	0	0	1
168.	FRG	Adv. Flt. Cntrl. Tech.	1972	1	1	1	1	1	1	1	1	1
169.	FRG	Cartography Tech.	1972	1	1	1	1	1	1	1	1	1
170.	FRG	Remotely Piloted Veh.	1972	1	1	1	1	1	1	1	1	1

NOTES:

* Essential to national stability

Appendix I (Continued)

No.	Country	Project	Year	Variables								
				1	2	3*	4	5*	6	7*	8	9
		Miscellaneous										
171.	Korea	AN/PRC-77 Radio	1973	1	1	-1	-1	1	0	0	0	1
172.	Italy	ARGUS 10 Radar	1974	1	1	-1	-1	0	0	1	0	1
173.	FRG	SLAR (UPD-X)	1975	1	1	1	0	1	1	1	1	1
174.	FRG	MOD FLIR	1978	1	1	1	1	1	1	1	1	1
175.	France	MLRS - A	1978	1	1	1	-1	1	0	1	0	1
176.	FRG	MLRS - B	1978	1	1	1	1	1	1	1	1	1
177.	U.K.	MLRS - C	1978	0	1	1	-1	1	0	1	0	1
178.	Canada	ACLS	1970s	0	1	0	0	1	0	1	0	1
179.	Australia	General - A	1960	1	1	1	1	1	1	1	1	1
180.	Belgium	General - B	1960	1	1	-1	-1	1	1	1	1	1
181.	Denmark	General - C	1960	1	1	1	1	1	1	1	1	1
182.	France	General - D	1960	1	1	1	1	1	1	1	1	1
183.	FRG	General - E	1960	1	1	1	1	1	1	1	1	1
184.	Italy	General - F	1960	1	1	1	1	1	1	1	1	1
185.	Netherlands	General - G	1960	1	1	1	1	1	1	1	1	1
186.	Norway	General - H	1960	1	1	1	1	1	1	1	1	1
187.	Portugal	General - I	1960	1	0	0	0	0	0	0	1	1
188.	Turkey	General - J	1960	1	1	-1	-1	0	0	1	0	0
189.	Argentina	General	1970	1	1	-1	-1	1	0	1	0	0
190.	FRG	General - A	1978	1	1	1	1	1	1	1	1	1
191.	Norway	General - B	1978	1	1	1	1	1	1	1	1	1

NOTES: * Essential to national stability

Appendix J

SPSS Control File Program

```
pagesize      33
run name      Offsets in International Arms Transfers
file name     offsethb.SPSS
variable list x01 to x11, x13 to x18
input medium  disk
n of cases    191
input format  fixed (F3.0, 16 (x,F2.0)
missing values all (0)
var labels    x01, Recipient Stability/
              x02, National Prestige/
              x03, Policy for Offsets/
              x04, Employment Base/
              x05, Industry Development/
              x06, Development-Production Commitment/
              x07, Share Technology/
              x08, Formal Alliance/
              x09, Access or Basing/
              x10, Balance of Payments Concerns/
              x11, Economy of Scale/
              x13, GNP > LDC/
              x14, Able to Receive Technology/
              x15, Able to Pay/
              x16, Same Measurement Standards/
              x17, Readiness Impact/
              x18, Implemented
value labels  x01 to x 17 (1) yes (0) unknown (-1) no
task name     Discriminant Analysis of Offset Cases
read input data
discriminant  groups = x18 (1,2)/
              variables = x01, x02, x03, x04, x05,
              x06, x07, x08, x09, x10, x11, x13,
              x14, x15, x16, x17/
              method = rao
options       5, 7, 9, 11, 12
statistics    1, 2, 3, 4, 5
finish
```

Notes: a) The nonimplemented cases in x18 were changed from -1 to 2 to accommodate SPSS program limits.

b) This program eliminates those cases with missing values. To analyze all cases option 1 was substituted for option 9 and the program was rerun.

c) In the final run xl6 was suppressed. Under analysis xl6 was changed to level 0 and other variables were held at level 1.

d) Control words are small case because program was run on system with PL1 data base.

AD-A121 567

A MODEL FOR THE EVALUATION OF OFFSETS IN INTERNATIONAL
ARMS TRANSFERS(U) SAINT LOUIS UNIV MO H L BAILEY 1982

UNCLASSIFIED

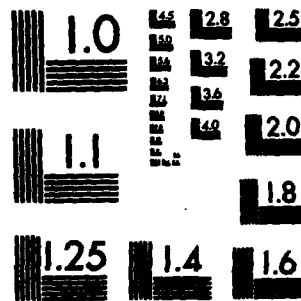
F/G 15/5

NL

END

DATE
FILMED

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Appendix K

SPSS Control File Program

Modified for Classification Only

run name	Offsets in International Arms Transfers
file name	offsethb.SPSS
variable list	x01 to x08
input medium	disk
n of cases	191
input format	fixed (3x,7(x,F2.0))
missing values	all (0)
var labels	x01, National Prestige/ x02, Employment Base/ x03, Industry Development/ x04, Development-Production Commitment/ x05, Share Technology/ x06, Balance of Payments Concerns/ x07, Readiness Impact/ x08, Implemented
value labels	x01 to x07 (1) yes (0) unknown (-1) no
task name	Discriminant Analysis of Offset Cases
read input data	
discriminant	groups = x08 (1,2)/ variables = x01 to x07/ analysis = x01 to x07/ method = direct
options	1, 5, 6
finish	

Notes: a) Data file must be modified to use this program. Variables x01, x03, x08, x09, x11, x13, x14, x15 and x16 must be deleted from the data file and variables x02, x04, x05, x06, x07, x10, x17 and x18 must be relabeled in order x01 to x08.

b) Control words are small case because program was run on system with PL1 data base.

VITA

Henri Louis Bailey, III

Henri L. Bailey, III received a B.A. from Roosevelt University in Chicago, Illinois, in 1962 with a double major in Psychology and Sociology. He began his career with the United States Air Force in 1962 as an administrative officer, receiving his navigator rating in 1964. His early career involved various world wide assignments in support of military and diplomatic missions.

Mr. Bailey resumed his formal education in 1971, and completed the Master of Business Administration with Southern Illinois University in Edwardsville in June 1973. In the summer of 1974, he began the doctoral program at Saint Louis University, with a major in Management Science and a minor in Psychology.

Mr. Bailey, most recently, was the manpower and personnel resource programmer in the Directorate of Programs, Headquarters, United States Air Force, in which capacity he ensured that manpower requirements had been properly matched to Air Force force size planning and fiscal constraints. Currently, he is in the process of establishing his own consultancy business. He resides with his wife, Carolyn, and their two sons, Henri and Shawn, in Fairfax, Virginia.

